

OCEAN POLLUTION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON OCEANS AND ATMOSPHERE

OF THE

COMMITTEE ON COMMERCE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

ON

S. 1067

TO AMEND THE OIL POLLUTION ACT, 1961 (75 STAT. 402), AS AMENDED, TO IMPLEMENT THE 1969 AND THE 1971 AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF THE POLLUTION OF THE SEA BY OIL, 1954, AS AMENDED, AND FOR OTHER PURPOSES

S. 1070

TO IMPLEMENT THE INTERNATIONAL CONVENTION RELATING TO INTERVENTION ON THE HIGH SEAS IN CASES OF OIL POLLUTION CASUALTIES, 1969

S. 1351

TO AMEND THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, AND FOR OTHER PURPOSES

JUNE 12, 13, AND 28, 1973

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SUMMARY OF THE PROCEEDINGS

The concept of pollution involves changes affecting the quality of life or resources. More often than not, however, the term pollution connotes a value judgment of degradation. While most, if not all, definitions see pollution as being alterations, a difference exists in how those changes are evaluated and in what sense the changes are indeed considered pollution. What is a pollutant and pollution depends to some extent on one's point of view, for example: Heat can be a water pollutant or a source of warmed water for irrigation; solid wastes can be viewed as a disposal problem or as a source of raw materials. Clearly then, the concept of pollution is affected by one's view of the potential pollutant, and what benefits or damages it may bring about.

There is a growing concern that the dispersal of pollutants—everything from DDT to monofilament fishnets—is becoming worldwide. Once a substance that is considered a pollutant has been produced, either by man or by natural processes, unless it is contained at its source it inevitably finds its way into the ocean ecosystem. Some substances enter the ocean through river runoff, others are transported atmospherically, while still others are introduced into the ocean more directly, as when a tanker breaks up at sea, or a vessel intentionally discharges oil or pumps its bilges.

Although the concentration of these pollutants generally diminishes as a function of distance from industrial centers, their presence throughout the oceans is now deemed to be inevitable.

ACTIVITIES WHICH CONTRIBUTE TO OCEAN POLLUTION

Waste heat disposal.—Primarily from electric powerplants, these heated waters discharged into bays and estuaries of the coastal zone can cause noticeable effects on the local biological community.

Industrial effluent discharge.—In many nations, effluent discharge continues unabated, with concomitant increase in industrial development.

Ocean dumping.—The practice of barging wastes to sea for disposal constitutes another major source of ocean pollution.

Air pollution.—The enormous discharge, as exhaust products, of partially oxidized hydrocarbons and other noxious products of incomplete combustion eventually find their way to the open ocean via atmospheric transport and exchange across the air/sea interface.

Marine mining.—Commercial mining of ferromanganese nodules and offshore sand and gravel deposits is partly hindered by uncertainty regarding the environmental impact of marine mining activities.

Energy development.—Oil and gas exploration, development, and transportation as well as the construction of floating offshore powerplants and superports may be expected to have an increased impact on the oceans.

Nuclear energy.—Nuclear testing in the upper atmosphere, and the reprocessing of fuel from nuclear reactors are two significant contributors of radioactive pollution to the oceans.

MARINE POLLUTANTS OF GREATEST CONCERN

Pollutant characteristics.—According to Dr. Bostwick Ketchum, of Woods Hole Oceanographic Institution, there are three characteristics of each and every pollutant which must be taken into account before an evaluation can be made as to the possible impact on or hazard to the environment. These are: (a) The total quantities produced, and thus the amount which might be expected to reach the environment; (b) the toxicity of the pollutant to marine organisms, and to man if it reaches him through seafood; (c) the degree of persistence of the pollutant in the environment.

Major classes of pollutants.—The ocean pollutants of greatest global concern may be classified as heavy minerals, synthetic organic chemicals, petroleum, domestic wastes, and solid wastes.

Heavy minerals.—Toxic at low concentrations, and nonbiodegradable, the heavy minerals reach the marine environment as a result of weathering and their ultimate transport by rivers to the sea. Many are also present in coal and petroleum and are released in varying amounts to the atmosphere by combustion. Although some of the heavy minerals may be complexed and retained in bottom sediments, once added to the marine environments, they remain there permanently.

Synthetic organic chemicals.—A wide variety of synthetic organic chemicals is also reaching the environment including detergents, pharmaceuticals, and particularly the chlorinated hydrocarbons as DDT, and polychlorinated biphenyls (PCB's). Having been produced in large quantities, and now found even in the water and organisms of the open ocean, these compounds are not readily biodegradable and thus are extremely persistent in the marine environment.

Petroleum.—Oil pollution is an increasing threat because of our growing demands for energy and the increased transport of oil by oceangoing very large crude carriers (VLCC's). Crude oil, refined products, and petrochemicals are currently polluting the sea in large amounts. Sources include accidental spills, tanker operations, other vessel operations, offshore production, industrial and refinery operations, and automotive wastes.

Domestic wastes.—Domestic pollution consists of the natural products of human metabolism which are readily biodegradable and therefore are not persistent in the environment, save added fertilizing elements. Problems result, however, when the treated discharge exceeds the receiving capacity of the body of water to which it is added. Also, many sewage effluents contain toxic materials from industrial additions and urban runoff. Stepped-up treatment methods can remove most of these from the effluent, but they will still remain in the sludge which also must be disposed of in some manner.

Solid wastes.—The disposal of solid wastes poses increasing problem. Even though much is nontoxic, large quantities are involved. Solid waste materials dumped in the coastal waters of the United States comprise, among others, dredge spoils, industrial wastes, sewage sludge, construction and demolition debris, and explosives.

MOBILIZING FOR POLLUTION ABATEMENT

In order to provide an appropriate study of pollution in an area of specific interest, a project should have certain definite objectives. These should include, first of all, the establishment of environmental baselines for the area with respect to the physical, chemical, and biological processes going on in the area. This phase should relate information about the distribution of fish, shellfish, and bottom dwelling organisms. It should also determine the basic speed and direction of current movement—a critical mechanism in the transport of pollutants. Second, the project should note the changes induced in the system by the polluting activity, and be able to assess the consequences and implications of these changes. Third, the project should have as a goal the improvement of one's ability to predict the consequences of man's activities that pollute the environment. This entails determining key parameters to be monitored which would provide the necessary advance warning information. In this respect, the expanding technology of environmental monitoring through sensors on satellites, buoys, ships, and other platforms will provide valuable assistance. Sensor technology can furnish an indication of the presence and extent of pollutants as well as outline the processes that disperse and dilute these substances. With knowledge of these processes, the oceans can be used more effectively to dilute certain type of relatively harmless wastes while at the same time broadening one's capability to cope with harmful substances released by accident.

RECOMMENDATIONS FOR SOLVING THE PROBLEM OF OCEAN POLLUTION

Federal Legislation.—Recent Federal legislation such as the Clean Air Amendments of 1970 (Public Law 91-604) may be expected to reduce the atmospheric transport of pollutants which eventually reach the ocean by exchange across the air/sea interface. Other legislation, namely the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), and the Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532), may be expected to significantly reduce direct ocean pollution. The Federal Water Pollution Control Act Amendments have as their target the policing and eventual elimination of the discharge of pollution substances; for example, industrial effluent, into navigable waters, and the oceans at large. The National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Corps of Engineers, and the Coast Guard in implementing the requirements of the Marine Protection, Research and Sanctuaries Act which is concerned with a major source of pollution, ocean dumping. These regulatory agencies have begun to carry out the permit provisions of this legislation.

International Cooperation.—Cooperation among nations is an integral part of any program designed to deal with and eventually curb marine pollution. No one country alone can make all the measurements required nor hope to stem pollution by unilateral action. Intergovernmental cooperation is also necessary in order to integrate global marine pollution control activities.

The National Science Foundation is supporting work related to ocean pollution, a substantial portion of which is carried out under

the auspices of the International Decade of Ocean Exploration (IDOE) program. Thirty-two nations are contributing to this program which is directed toward the preservation of the quality of the marine environment. In this regard, IDOE has sponsored an intensive project aimed at making measurements at sea of the concentration of compounds considered potentially hazardous to man or marine life.

It is hoped that a significant part of the newly created United Nations Fund on the Environment will be devoted to work in the marine pollution abatement area. One international program is already underway which promises to assist in efforts to monitor marine pollution. The Integrated Global Ocean Station System (IGOSS) program has already been collecting information about ocean temperatures from ships of many nations and relaying same to national data centers where the information is used to predict the movements of large scale ocean weather systems. Further plans include a program that would require ships at sea to report sightings of oil slicks, flatable debris, plastics, and tar balls thus providing a measure of the severity of ocean pollution problems.

Another international cooperative program just begun, and also under U.N. guidance, is the Global Investigation of Pollution of the Marine Environment, GIPME of the Intergovernmental Oceanographic Commission. This is a cooperative program of scientific research concerned with marine pollution carried out primarily in the national laboratories of cooperating nations. It deals with sources and inputs of pollutants into the ocean; their transfer and transformation by physical, chemical, and biological processes; their effects on marine organisms; and their fate in the ocean ecosystem.

The Intergovernmental Maritime Consultative Organization (IMCO) also continues its regulatory activities and concern with the problems of pollution from shipping activity. In this regard, IMCO has been responsible for significant treaty regulations regarding vessel pollution.

Enforcement.—Where the protection of the marine environment is concerned, the importance of creating an international mechanism with the capacity to enforce the provisions of pollution conventions cannot be overemphasized. This international regulatory machinery should be able to exercise jurisdiction both from a geographic point of view—areas beyond territorial limits as well as within, and from the point of view of the sources of injury to the environment, including those that occur on land in addition to those activities taking place in the ocean itself.

CONCLUSIONS

Ocean pollution is an acute problem. It is a matter for concern not only in many local and some regional areas, but on a global scale as well.

Insofar as possible, human actions responsible for ocean pollution and having deleterious effects on human health as well as other living organisms should come in line for effective regulation. Steps have already been taken in this area through Federal laws, and international conventions.

Our knowledge of the many aspects and characteristics of ocean pollution is in some cases incomplete, and otherwise tenuous at best. We must develop a sharper understanding of the extent of contamination by determining sources and tracking the distribution of pollutants. We must better determine the lethal levels of pollutants, as well as their long term nonlethal effects on the ocean ecosystem. And whereas natural or cyclic phenomena have sometimes been confused with man's impact, we must attempt to understand which phenomena are natural, which phenomena are man-induced, and those over which we have some control.

OCEAN POLLUTION

TUESDAY, JUNE 12, 1973

U.S. SENATE,
COMMITTEE ON COMMERCE,
SUBCOMMITTEE ON OCEANS AND ATMOSPHERE,
Washington, D.C.

The committee met at 10:03 a.m., in room 5110, Dirksen Senate Office Building, Hon. Ernest F. Hollings (chairman of the subcommittee) presiding.

OPENING STATEMENT BY SENATOR HOLLINGS

Senator HOLLINGS. Good morning. The committee will please come to order.

I am pleased this morning to convene the Symposium on Ocean Pollution of the Senate Commerce Committee, Subcommittee on Oceans and Atmosphere. Our purpose is to compile information and help guide the Congress toward an improved understanding of the special problems caused by mankind's pollution of the sea.

On October 18, 1971, the noted undersea explorer and film maker Jacques Cousteau told this subcommittee that if civilized man does not act quickly to protect the fragile ecosystem of the world's oceans, life in the sea may disappear in 20 to 50 years. This statement was Captain Cousteau's personal opinion, based on his own observations rather than any long-term coordinated scientific investigation. We hope today to begin developing the information needed to determine the accuracy of that statement and to establish a direction for the future.

I am convinced that we must begin to change our priorities if the sea and its resources are to be protected. There is evidence that we are indeed killing the oceans. It would be a cruel irony should man eventually cease to exist on this planet, not because of nuclear war or disease, but because he destroyed the life force of the world's oceans.

Scientists and laymen are beginning to realize that every pollutant, whether in the air or on land, can end up in the oceans. The filth which is flushed into the harbor in Hong Kong can wash up on the beach at Trinidad. The DDT and herbicides which flow into the Gulf of Mexico from the Mississippi River eventually can be traced into the tissue of the grey whale and polar bear above the Arctic Circle.

We have always thought that the oceans were a huge cesspool, capable of assimilating all of man's waste. Now we know this is not true. Pollution dumped into the oceans may remain for thousands of years. Although the ocean has many currents and movements, many

Staff member assigned to these hearings: John F. Hussey.

parts of the deep ocean have virtually no motion. The nerve gas which is dumped into the South Atlantic may still be there 10,000 years from today.

The dangers are most acute in the waters close to our shores. The nearby Chesapeake Bay is one of the most important estuaries in the world for the production of fish and shellfish. But each year we hear of pollution incidents which take an ever-widening toll of sea life. And just the other day, New Jersey was forced to close more than 5,000 acres of shellfish waters in the Delaware Bay because of pollution.

Last summer, the United States sent a distinguished delegation to the United Nations Conference on the Human Environment in Stockholm, Sweden. Senator Magnuson, the chairman of this committee, was a member of that delegation. It has been a year since that meeting, and one is forced to conclude that the wheels of international machinery turn very slowly. Not much has been done, and yet so much must be accomplished in a short time.

Our first witness this morning is Dr. Robert M. White, Administrator of the National Oceanic and Atmospheric Administration. Immediately after he is finished, we shall hear from Dr. Stever of the National Science Foundation, and our other distinguished witnesses.

Are you going to bring your jury with you?

STATEMENT OF DR. ROBERT M. WHITE, ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE; ACCOMPANIED BY DR. WILLIAM ARON; AND JAMES BRENNAN, GENERAL COUNSEL

Dr. WHITE. Yes, Mr. Chairman.

Mr. Chairman and members of the committee, I would like to introduce my colleagues. I have Dr. William Aron; and on my right, James Brennan, who is our General Counsel.

I am pleased to have the opportunity to appear here today to testify on the problems of ocean pollution and on NOAA's programs to address those problems.

Your committee's inquiry into this matter is timely and welcome. The International Conference on Ocean Pollution sponsored by the committee in the fall of 1971 yielded a number of wide-ranging and thought-provoking views on pollution and the future of the world's oceans. We look forward to hearing the views of those who will be testifying here this week.

The U.N. Conference on Human Environment last year, in addressing environmental questions of global concern, focused the attention of the world community on ocean pollution. As you know, that conference set in motion a series of actions to address these problems.

A prime example was the international convention on ocean dumping signed in London last winter. I will be leaving after this hearing to attend the first meeting of the U.N. Environmental Program Governing Council, in which we will consider implementation of such measures as a global monitoring program.

The Intergovernmental Maritime Consultative Organization of the United Nations will be meeting this October to consider a convention concerning vessel discharges of oil and other pollutants at sea. All

these actions indicate a growing international awareness of the need to protect the health of the ocean.

Much has been written and much has been said about the ocean pollution problem in recent years. Oil pollution achieved worldwide attention with the *Torrey Canyon* accident in 1967. This provided dramatic evidence of the ecological impact of a major marine disaster.

This was further highlighted by the Santa Barbara oilspill. Since then we have become aware of the more pervasive nature of oil pollution.

Thor Heyerdahl, in addressing this committee at its last conference, described encountering widespread evidence of oil contamination in crossing the Atlantic on his raft, the *Ra*.

More recently, the results of our own NOAA MARMAP fisheries cruises attracted major public notice. These cruises were designed to study distribution and abundance of the eggs and larvae of fishes.

In the course of towing their plankton nets, however, our scientists found oil and plastic materials in many of their samples over a very large expanse of the Atlantic and Caribbean. A repeat survey 6 months after the first found essentially the same widespread oil and plastic pollution, and if I can diverge from my prepared statement, Mr. Chairman, what I would like to do is illustrate the widespread nature of this pollution we have been finding and give you some examples of it.

On the chart, you see the density of tar globules along the Atlantic coast. As you can see, the distribution of tar globules is pretty general throughout the eastern coast.

On the next chart, we have a similar chart, similarly displayed, of information dealing with the density of plastics, and again we find that plastics have become so ubiquitous over the world's oceans and are widely distributed wherever our research ships have carried out their surveys.

Senator HOLLINGS. I am reading 4.4, off South Carolina, and off New York it is 71.

Dr. WHITE. That is right. Off New York, you have a lot more marine traffic. It is 71 grams per kilometer of plastic material.

Senator HOLLINGS. What is the damage to marine life caused by the plastics?

Dr. WHITE. We don't know. We know it is widespread. We don't know the extent to which it gets into the marine ecosystem. We don't know the extent to which it is swallowed by fish larvae and things of that nature. This is one of the things we have to find out.

I have here some samples that were actually taken, Mr. Chairman, in these surveys. This first one, which I can hand out, was taken in the vicinity of Bermuda. This one principally shows the kind of tar that we are finding pretty widespread across the ocean. This one taken off Cape May, N.J., shows the amount of plastic that would be picked up in one of these plankton net tows.

That will give you a real feel, I think, for the kinds of things that are very, very widely spread across the ocean.

Senator HOLLINGS. Has there been any similar testing up on the west coast or on the coast of Alaska?

Dr. WHITE. Our principal work, so far, has been in the East, but we do intend to carry out similar surveys on the west coast.

Even more recently, NOAA scientists reported that thousands of pieces of plastic, ranging from tiny scraps to fish nets 100 feet long, litter Alaska's remote beaches. Mercury pollution has led to worldwide concern, and has had heavy impact on parts of the U.S. fishing industry. There have been long-standing reports of DDT in the Antarctic food chain.

Findings of the impacts of waste disposal on the New York Bight were instrumental in calling attention to the ocean dumping problem, and in subsequent enactment, under leadership of this committee, of the Marine Protection, Research, and Sanctuaries Act of 1972.

What are we to make of these observations, which indicate the effects of man's activities extend far from our shores, and from the Antarctic to the Arctic? How serious are these symptoms? What actions should be taken?

I know you and your committee have been concerned with these questions, Mr. Chairman. They must be addressed by all of us with responsibilities for understanding, utilizing and protecting the oceans.

Mr. Chairman, I would summarize my convictions on ocean pollution as follows:

1. Ocean pollution is an acute problem in many local and some regional areas. It is also a matter for concern on a global scale.

2. Human actions causing pollution of the oceans, with significant effect on human health and other living organisms, should be considered for effective regulatory efforts. We have already taken steps in this area through recent Federal laws. International conventions are being developed toward similar ends.

3. The gaps in our knowledge of ocean pollution are serious. We must improve our understanding if we are to reconcile growing conflicts between economic development and protection of the ocean environment.

I would like now to look at some of the activities which contribute to ocean pollution.

In the face of increasing recognition of the need to protect our ocean resources, we are also seeing growth of man's activities in the ocean. Some of man's impacts on the ocean, such as waste disposal, are of long standing. Others, such as offshore powerplants and superports, are still on the horizon.

Collectively, these activities will add up to greater use and an increased impact on the ocean. Some of those uses can be damaging if allowed to proceed without concern for environmental protection.

I am convinced, however, that they can be managed in such a way as to reduce or minimize harmful environmental effects, and under certain circumstances, such as the controlled use of waste heat in mariculture, can be beneficial.

EFFLUENT INPUTS—RIVER AND DIRECT COASTAL DISCHARGES

We can estimate very roughly that the volume of waste discharges from the U.S. countries immediately bordering the ocean and Great Lakes, where 81 million people live, is roughly equivalent to the average flow of the Potomac River. These discharges cause local and regional problems in coastal waters.

The New York Bight, with its adjacent population of about 20 million persons, is one of the more conspicuous examples of a section of coast plagued by its waste loads.

The Baltic Sea and the Mediterranean are also experiencing similar problems.

Wastes going into our waters include heat, primarily from electrical powerplants. These heated waters, discharged into bays and estuaries, such as Biscayne Bay in Florida or Massachusetts Bay, can cause noticeable change in the plants and animals that live there.

NOAA scientists and university researchers working under NOAA's sea grant program in several States have been investigating the effects of waste heat disposal. Studies are also underway to determine possible beneficial uses of this waste heat for aquaculture.

In many nations, effluent discharges continue unabated, and may be expected to increase with increasing industrial development.

However, in the United States, we can be optimistic that these discharges will be brought under much better control through implementation of the Federal Water Pollution Control Act Amendments of 1972.

OCEAN DUMPING

As this committee well knows, the practice of barging wastes to sea constitutes another major source of ocean pollution. NOAA is working with the EPA, the Corps of Engineers, and the Coast Guard in implementing the requirements of the Marine Protection, Research, and Sanctuaries Act of 1972. The regulatory agencies have begun to implement the permit provisions of the legislation. We are working with them to devise a scientific information program to assist their regulatory decisions.

NOAA's work in response to the act is initially focused in the New York Bight, where our most serious ocean dumping problems occur. As part of our marine ecosystems analysis program which will be discussed tomorrow, we are undertaking very comprehensive investigations of dump sites in the apex of New York Bight.

Senators HOLLINGS. Isn't that the research grant that you and I were discussing at the Appropriations Subcommittee hearing the other day with regard to the research program? Hasn't there been a cutoff there of research money under the administration's requests and programs?

Dr. WHITE. The amount of money which has been requested in the President's budget is not nearly the amount of money authorized for the program, but there is an increase in our work along these lines.

Senator HOLLINGS. To refresh my memory, what was authorized and what was requested? What is authorized? What do you have presently ongoing, and what is in the 1974 budget, so we can bring it in perspective?

Dr. WHITE. We have asked for no increase over a base in 1974—approximately \$2.5 million—for the work that we will be doing in support of ocean dumping research.

Senator HOLLINGS. How about New York by itself?

Dr. WHITE. Most of this money will be directed toward investigations in the New York Bight.

Senator HOLLINGS. Are you saying there is no cutback? My recollection was that there was a material reduction.

Dr. WHITE. The amount authorized by the bill is \$6 million for that work. The amount of money in our base remains approximately \$2.5 million for this kind of work.

Senator HOLLINGS. For the New York Bight?

Dr. WHITE. That is right, sir.

Senator HOLLINGS. All right.

Dr. WHITE. We are also working with EPA to consider the possibility of utilizing a site off the Outer Continental Shelf for disposal of wastes from the New York and Philadelphia metropolitan areas.

Through our manned undersea science and technology program, we have supported investigations of dump sites in southern California. Underseas technology provides unique opportunities for first-hand observation of dumping problems. We plan to continue to utilize it as an important aid in characterizing potential dump sites and to survey and monitor the extent of the impact of dumping.

Senator HOLLINGS. Governor Rockefeller testified last week relative to the study of the clean air and clean water divisions. He is on one of the study commissions. We discussed the New York Bight, and it seems like New York is putting in a substantial effort there to forego any further pollution and dumping.

What is New Jersey, or what is the Philadelphia area doing? Are they similarly acting in a laudable fashion? Are they cooperating in putting in public bonds as they have done in the State of New York, or not?

I am just wondering what coordination and what support and cohesion you have from New Jersey and Philadelphia.

Dr. WHITE. With your permission, perhaps, I could ask Dr. Allan Hirsch, who is director of our marine ecosystems analysis program, if he has that information.

Dr. HIRSCH. I have some, sir. I think those two States are moving ahead to construct sewage plants, but the problem is that in providing higher levels of sewage treatment, you also provide higher levels of sludge which have been disposed of by ocean dumping.

So in the case of Philadelphia, for example, Senator, Philadelphia is dumping sludge at sea now and is continuing to seek permission from EPA to dump increased loadings of sludge at sea.

In that regard, we are working with EPA to look at the possibilities of a site off the edge of the Outer Continental Shelf, and we will be evaluating that in the months that lie ahead.

Senator HOLLINGS. But Philadelphia or Pennsylvania is not issuing any bonds as New York did?

Dr. HIRSCH. I can't speak to how they are financing their cleanup. They are moving ahead with construction of waste treatment facilities.

The point I would emphasize is that that does not in itself solve the ocean dumping problem, because you then have to get rid of the sludge.

Senator HOLLINGS. Thank you, sir.

AIR POLLUTION

Mr. WHITE. Air pollution has been an important contributor of wastes to the ocean. Most of us tend to associate oil pollution with shipping and offshore drilling for oil, but their contribution to the man-imposed burden of pollutants to the ocean may very well take a

third place behind the runoff of oil from parking lots and the enormous discharge of partially oxidized hydrocarbons into the atmosphere, most of which must reach the oceans by way of river transport and air-water exchange in the open ocean.

Atmospheric transport of chlorinated hydrocarbons from land sources into the oceans is also demonstrated by their worldwide occurrence in marine organisms, including those found far from any land source. Other substances, such as lead and mercury, are also transported in this manner.

Estimates concerning the amounts of various wastes contributed to the ocean by the air route, as compared with river discharges and other sources, are still tenuous at best.

The reason for this uncertainty is that measurements of the appropriate character have not been made. Waste transport through all mechanisms, including effluent discharges, ocean dumping and air pollution must be quantitatively measured and understood if we are to maintain the quality of the marine environment. We have learned that ocean contamination is a total environmental problem.

Recent Federal legislation, such as the Clean Air Act, can be expected to significantly reduce atmospheric transport of pollutants. Other legislation such as the Federal Water Pollution Control Act and the Marine Protection, Research and Sanctuaries Act can be expected to significantly reduce direct ocean pollution.

MARINE MINING

There is a clear future potential for utilizing ocean mineral resources including ferromanganese nodules, the mineral-rich objects found on the ocean floor in a number of areas in the Pacific and elsewhere. Their widespread occurrence was first established 100 years ago. Extensive exploration within the last 10 years by industry and academic institutions has revealed that these mineral deposits constitute a potential source of ore containing valuable components of manganese, copper, nickel, and cobalt, as well as trace elements.

It seems likely that we will see commercial mining of these deposits in the future, yet the environmental impact of deep-ocean mining is unknown. The nodules richest in mineral values occur in the abyssal depths and usually in areas of low biological productivity far from land, or traditional fishing grounds.

In order to begin to establish information relating to the environmental impact of deep sea mining, NOAA is supporting a study to obtain baseline measurements of the marine environment at a typical site about 1,200 miles east of Hawaii. It is a start toward assessing environmental effects of future mining operations.

Offshore sand and gravel deposits as construction materials constitute another marine resource with great potential for expansion. Unlike mining of ferromanganese nodules, sand and gravel mining would take place quite close to land and in relatively shallow waters. Offshore sand and gravel deposits have long been mined in the United Kingdom and other European countries.

In Japan, 18 percent of the total sand and gravel production is supplied from the sea floor; in the United Kingdom the production is up to 13 percent.

The Atlantic Continental Shelf contains enormous deposits of sand and gravel which have potential for construction purposes as well as for restoration and stabilization of storm-damaged beaches.

Uncertainty regarding the environmental impact of offshore mining has hindered development of this resource. It is known that such activities disturb the bottom sediment and cause increased turbidity which may have a significant adverse impact on marine organisms.

There have been a number of studies of these impacts on ecosystems. Most of these studies, however, have been in connection with dredging or other practices in fresh and estuarine waters. This experience cannot be directly extrapolated offshore.

To develop environmental information on this practice, NOAA has been working on a program in cooperation with the State of Massachusetts to study, under controlled conditions, environmental impact of sand and gravel mining in Massachusetts Bay.

ENERGY DEVELOPMENT

The energy crisis highlights the fact that oil and gas exploration, development, and transportation will have increasing impact on the oceans. Oil shipment and oil imports to the United States will increase greatly.

The President's energy message, in setting forth a series of actions designed to attack energy shortages, called for a threefold increase in oil and gas leasing on the Outer Continental Shelf during this decade. NOAA is participating with the Council on Environmental Quality and other Federal agencies to assess the environmental impact of oil and gas drilling in the Atlantic Outer Continental Shelf and the Gulf of Alaska.

Construction of major offshore structures for energy development and other purposes, also promises to be increasingly important in future years. Construction of offshore airports, floating powerplants, superports, and even offshore cities could pose a variety of pollution and related environmental impacts, unless carefully regulated.

Recently, Chairman Russell Train of the Council on Environmental Quality testified before this committee concerning findings of studies of the environmental impact of potential superports, including studies sponsored by the NOAA Sea Grant program. We are also participating with CEQ and other Federal agencies in a broad scale study of offshore nuclear generating facilities.

Senator HOLLINGS. Doctor, what is being done as a practical matter to reduce the doubt and concern and bring it down to realistic terms for shoreline locating of oil refineries?

In other words, in addition to the offshore and the Continental Shelf and the superports and all that, I am talking in terms of 3, 5, or 10 years; in the next year, the next 2 years, there are going to have to be some refinery facilities, and the cry of the big oil companies now is that we in the Congress are breathing down their necks, and that after all, we are not allowed to locate a refinery, and do you want one on your coastline?

I don't know how to answer the question. What danger is there? What cost, what impact is there? Can it be tied in a little more directly to the immediate problem rather than the offshore superport, which we are very much interested in?

But what in the next year or 2 years, what kind of studies or coordination with this energy crisis and the location of oil refineries at the shoreline? Is it bad for me to put one in South Carolina, or is it good, and what are you doing to supply that answer for me?

Dr. WHITE. Well, it is clear, Senator, that each case has to be judged by itself, because you are dealing with a particular locality, a particular siting, and a particular plant has waste products peculiar to it.

It applies not only to oil refineries, but other industrial activities that you might undertake on the shoreline.

Senator HOLLINGS. When we had the Suez crisis, they brought oil from Venezuela into our ports in South Carolina, and to other ports. They released all their purchases along that area, but assuming those were areas that they still would want, and would want to relocate. Now, what damage would there be? You know of our marine science center, and you have visited in that coastal area. A typical oil refinery in that area would do what damage? That is what I would want to know in general terms rather than a specific study, so that we in the political arena will be able to respond properly.

Dr. WHITE. Well, what I am about to say will be totally speculative, but the environmental impacts that we are concerned about can take place at a number of points in the sequence of events that would lead to refining of the oil.

First, of course, should you have an accident in the transport of the crude oil to a refinery, you have the kind of problem that we had with the *Torrey Canyon*. Now, we know something about the effects of crude oil. It has a rather devastating effect on recreational activities in the area.

Senator HOLLINGS. How likely is a *Torrey Canyon*? If you use the same on airplanes, some will crash—

Dr. WHITE. I would have to know the nature of the ship involved, the traffic, and the particular harbor. I would have to know what kind of safety procedures are observed. There are large ports that deal with the importation of oil from very, very large tankers that are highly modern and have very little impact, like Milford Haven.

Senator HOLLINGS. Aren't there established refineries where you could conduct research and find out what the experience was where some are located? There is the environment and the coastal zone, and you can tell how much damage has occurred in this particular area, in Galveston, or out in Santa Barbara. Of course, that was drilling. I was speaking of a refinery.

Dr. WHITE. I will discuss later in my testimony some of the results that occur from crude oil as far as its effects on living resources, but we are also concerned about low levels of oil concentrations on fish. We are concerned about spills of crude oil and the things that it can do to the beaches and also to the area in general. What we need in each case is more environmental information than we presently have.

One of the points I will be making later in my testimony is that indeed there is a significant absence of knowledge on the full effects of many of these things. I don't know I can get—

Senator HOLLINGS. Who is to make practical your research? In other words, I am not, of course, disparaging it, because I am a full supporter of the program. We got a bill through the Congress. But what I am getting to is who is to find out whether or not oil refineries should

be or should not be located during this particular time during this energy crisis?

It seems like we could be furnishing that. We have agencies, yours and the CEQ, EPA, and others, and how should we treat the alarm? You can find out all the damage to the ecosystems and the fisheries, and how the *Torrey Canyon* might ruin the beach, and I know all that. Are you telling me from an environmental standpoint that you can't get there from here, that you can't build a refinery?

Dr. WHITE. No, I don't want to leave that impression at all.

Senator HOLLINGS. Then where can you build one with the least amount of damage? Don't you think the NOAA could at least establish that?

Dr. WHITE. I think we could have a great input into that. We do have the National Environmental Policy Act which provides for making sure we know to the best extent of our knowledge what the environmental impact would be of any significant Federal actions. This is a very significant way in which decisions are made as to what will happen to the environment, and whether a deterioration of the environment is to be accepted in return for the building of a refinery or an industry.

Senator HOLLINGS. But your agency is the only one with objective research conducted along this line. If I were on the city council in the town of Beaufort, S.C., where would I go? We have the oil people saying it is a lovely thing, and you have the environmentalists saying the world is going to come to an end. Where do I go to find out whether I want an oil refinery or not, other than NOAA? Your agency, right?

Dr. WHITE. We have programs that are designed to specifically assist the States in problems like this. Our sea grant program is in great part directed to the problems of the coastal zone, and has provided great assistance to the State governments and municipalities in questions of the kind that you have been raising.

Our Fisheries Service has prepared and has rendered advice and assistance to States and communities concerned with the impact of anything you might want to do which might affect spawning and nursery grounds of fish or have an adverse effect on fisheries.

So we do have a rather extensive capability, and we do apply ourselves to problems such as this. It doesn't say we are the only one.

Senator HOLLINGS. You have the grants, you have the fisheries, and you have the coastal zone. You are backed almost entirely with—I think you said \$255,000. That is a covered dish meeting you are going to have in Annapolis. You won't have enough to feed the troops. We will get some money.

You have coastal zones and sea grants, and fisheries, and you have ocean pollution. Is there within your agency a coordinated report with respect to the impact, so I won't have to be almost a research scientist in governmental procedures to find the answer? I am a simple city councilman. The oil companies have come and told me all the visions of sugar plums. The environmentalists say it is going to ruin us forever. I can't be chasing around to Sea Grant, now, about it, and I know about it but how do you get an appointment with Dr. Abel and find out which one is making that study and how do you get to see him? It would take me 2 or 3 years to run through your department and coordinate the answer. Can't you coordinate it first?

Dr. WHITE. The problem you raise is a real one, and we have established an Office of Coast Environment, whose function in NOAA is to deal with our responsibilities for implementation of the coastal zone, the implementation of our responsibilities under the Ocean Dumping Act, and making sure that all the elements of NOAA who have something and can't contribute to coastal environmental problems are brought together.

So there is a single focus in NOAA that one can go to, to get action in our organization.

Senator HOLLINGS. That is what I want to know, because we senators have to answer these questions. When they come to us, we can go to the coastal and environmental office in NOAA to determine whether a refinery is generally, and I am not talking specifically, but whether it is generally good or bad?

Dr. WHITE. The Office will see that you get whatever information we have available with regard to that kind of a question.

Senator HOLLINGS. I think this is some of the research, and obviously it is very practical and very real, and yet generally at this particular time I find a lack of that type of authoritative information as to what the true impact is, what the cost factors are that are involved. Because when we vote on these things, none of us ever knows the dollars and cents figure put out there on the side by them. What is the practical impact, where you have the emission levels on the automobile now which have been lessened by the President, and we find that we enact laws that are not realistic.

Dr. WHITE. I think, Mr. Chairman, we need a great deal more information about the kind of problems that you are talking about than we presently have. I think that is clear.

As I indicate in my testimony, that is true. I think it is important to emphasize the point which you are making—that the decisions that are to be taken with regard to the use of that coastal zone, whether it be for refineries or what have you, really ought to be based on the best scientific and technical information that we can provide. These decisions have got to be made in a rational way.

There are value judgments that have to be made, but at least the value judgment as to how we use the coastal zone ought to be based upon good scientific and technical information, rather than emotional reactions or speculation.

Our organization is attempting to provide this kind of scientific and technical information so that people who are responsible for making those decisions about the use of our coastal zone can make them in the light of that kind of data.

Senator HOLLINGS. Very good, sir. Thank you. You may proceed.

Dr. WHITE. I would like to talk a bit about the major classes of ocean pollutants, and perhaps this will add some additional information on the thing we have been talking about, and while we have described a number of activities which can cause ocean pollution, particularly if not carefully regulated, we know that many of the contaminants stemming from these activities, such as sediment, organic materials, pathogenic organisms, and waste heat, cause serious coastal or estuarine pollution problems.

However, serious as these problems are, I would like now to turn to an issue which I regard as being of central concern.

What is the cumulative impact of these various activities, and on what scale is that impact being felt in the immensity of the world's ocean? To what extent is contamination of the open ocean occurring, as contrasted with pollution of the coastal waters, and how serious is that contamination?

Since 1970, we have been fortunate in having analyses of oceanic and atmospheric problems from a variety of highly expert groups to guide our thinking.

In 1970, the Massachusetts Institute of Technology sponsored a study of critical environmental problems of worldwide significance. In examining the issue of ocean pollution, the scientists involved concluded that the petroleum, pesticides, and toxic metals were the principal pollutants of global significance.

Since then, other groups working under the National Academy of Science, the National Science Foundation, and NOAA have assessed the pollution potential of substances entering the ocean. They, too, have concluded that petroleum, chlorinated hydrocarbons, pesticides, PCB's, and certain toxic metals are the ocean pollutants of greatest global interest.

However, despite broad general consensus about the contaminants which represent the greatest threat of global pollution, knowledge of their full extent, their fate, and their impact on the ocean ecosystem, is scanty at best.

OIL

It will come as no surprise that oil is one of the ocean pollutants causing the greatest attention. I have already mentioned our MARMAP cruises which indicated that tar balls were widely distributed from Cape Cod to the Caribbean. We will be having these samples analyzed in greater detail to see if we can trace the nature and sources of these materials.

That is part of the analysis I have shown you here.

A number of Federal agencies, as well as the industry, are beginning to compile information of this sort. NOAA is intensifying its activities to monitor the extent of oil contamination. We have initiated a study to determine baseline levels of petroleum constituents in selected marine organisms in Prince William Sound, Alaska, the southern terminus of the proposed Alaska pipeline.

By establishing these baselines now, we can detect the cumulative impact of any future oil contamination. Perhaps we can devise an early warning system for the area. We are also conducting similar activities in Puget Sound, and we plan to extend similar oil contamination sampling along the seaward route of oil transport on the Pacific coast in the future.

But we must not only understand the extent of contamination; we must also better determine its effects on the ecosystem. Our laboratories at Tiburon, Calif., and Auke Bay, Alaska, are studying the physiological and behavioral effects of oil on various marine organisms. Studies at Auke Bay are concerned with the effect of crude oil on crabs and salmon fry; those at Tiburon are concerned with effects of two oil components, benzene and toluene, on various species of fish. Our laboratory at Beaufort, N.C., is studying the pathways of petroleum hydrocarbons in a marsh ecosystem.

CHLORINATED HYDROCARBONS AND PLASTICS

One group of globally significant pollutants is totally foreign to the naturally occurring atmosphere and ocean—the manmade chemicals used as pesticides and industrial solvents and insulating fluids, PCB's. These compounds are extremely persistent. They may be carried by winds either clinging to particles or as vapors, and are accumulated and concentrated by organisms.

In other words, we have a persistent group of substances with known biological effects that can be dispersed throughout the entire atmosphere. We know that these materials are biologically concentrated and widely distributed throughout the marine food chain, including heavy concentrations in certain fish-eating birds.

Recent limitations on the use of these materials in the United States should assist in attacking this problem, although they continue to be used widely in many other nations. In the meantime, as with oil, we must track their distribution and learn more about their effects. NOAA's LaJolla Laboratory is attempting to gain an understanding of the distribution of chlorinated hydrocarbons in the California current and eastern tropical Pacific regions, the characteristics of sources of these pollutants, and the processes influencing their transport in the atmosphere and ocean.

We are presently cooperating with EPA to monitor pesticide residues in estuaries. We are also studying the effect of DDT on reproduction of anchovies and whether this DDT is transmitted to the eggs of this fish during exposure to DDT.

Plastics are also emerging as ubiquitous reminders of man's impact on world environment. NOAA's MARMAP program recently reported the widespread occurrence of plastic in the North Atlantic. Styrofoam cups litter much of the North Atlantic Ocean. While the biological effects of such plastic debris upon fish are not known, this is an area calling for continued scrutiny.

TOXIC METALS

Toxic metals are contaminants of global interest. They enter the ocean from many sources. Once there, they are indestructible. Our marine contaminants program is yielding some basic information concerning distribution of these materials in marine fishes. We are studying such things as the effects of heavy metals on all stages of mollusks, crustaceans and fish; the responses of membranes and cells to pollutants; and the movement of heavy metals from prey to predators and back into the environment.

I would like to talk now about some of the effects on human food resources, of great concern to all of us.

Thus far I have discussed these pollutants in forms of their effects on the ecosystem. Equally important questions center around their effects on human health basically on the extent to which these materials are contaminating food resources and making them unsafe for human consumption.

Pollution has had a heavy impact on the Nation's shellfish resources. About 30 percent of the Nation's presently harvestable oyster and clam beds are closed to harvesting because of contamination with human wastes.

NOAA is also studying the presence of heavy metals in marine resources and in fishery products. We are looking at over 200 species of fish and shellfish to determine presence of such metals as mercury; arsenic, cadmium, and chromium. Our findings to date indicate that these elements are present in very low levels on the average. In the few species where higher levels are found, all of our information shows that such levels are closely associated with the larger fish of a species and specific locations within their habitat.

I am pleased to say this information has successfully provided the basis for close industry and Government cooperation so that fish delivered to the American consumer meet public health requirements, and are both a delicious and safe food.

Senator HOLLINGS. We had to take swordfish off the market, and halibut.

Dr. WHITE. That is right.

Senator HOLLINGS. What has occurred as the result of those studies?

Dr. WHITE. One of the reasons we are carrying out this study is we believe if we can get adequate information, it is possible for us to manage that type of a problem. In the case of halibut, what it has done is set regulations on the take of halibut in certain sizes and certain areas. This insures that the fish coming to the table of the American consumer meets the FDA guidelines, and those fish that we know exceed the guidelines are not taken.

Now, we can do this if we know the distribution of these heavy metals in various species of fish, where they are located, what the size relationship is to the concentration of heavy metals. So we can manage these kinds of problems if we know about them.

Senator HOLLINGS. How do you determine the causes of distribution?

Dr. WHITE. In the latter part of my testimony I get into the interesting question of what is natural and what is manmade and what we ought to do about it.

In the case of mercury, most of it is not manmade, it is natural. It has always been there. If you take a sample from the Smithsonian Museum, taken a half century ago, and you examine it for mercury content, what you will find is the mercury content of the fish that we now take.

Perhaps Dr. Aron would want to comment on this more specifically. Most of the mercury in fish is natural. This is not to say there have not been pools of very serious contamination due to industrial processes. We know where they are.

Senator HOLLINGS. Did we check it out in that area, too?

As I remember it, they had a large paper pulp mill down there.

Dr. WHITE. That is correct.

Senator HOLLINGS. I thought a doctor in Wisconsin was making tests along that line. What occurred?

Dr. ARON. I think you will find, Mr. Chairman, that the commercial fishing in the Great Lakes has been severely reduced by the concentration of mercury and also DDT contained by the concentration of mercury and also DDT contained in the fishes, and the evidence is obviously for DDT is that this is manmade. Mercury does appear to be the result of industrial discharges.

Senator HOLLINGS. Mercury does not appear—

Dr. ARON. It does relate to the industrial discharge.

Senator HOLLINGS. Who follows up on that? Do you give that over to EPA?

Dr. ARON. I believe that is an EPA function, sir, and FDA.

Dr. WHITE. It is a cooperative activity. Of course, FDA has the responsibility for setting the levels of contaminants as a function of human health.

Senator HOLLINGS. Who goes back to the actual source?

Dr. WHITE. I think the information we would generate concerning pollution in fish is communicated to the EPA and to the FDA. They have responsibilities under the law. EPA has responsibilities to set regulations for the discharge of pollutants.

FDA has a job to ascertain whether the levels we find are a danger to human health and decide what should be done.

Senator HOLLINGS. Has anything been done in that area where Senator Stevens and others held hearings there? What resulted from those hearings?

Dr. WHITE. All that we have done, Mr. Chairman, is to make surveys of the mercury content in the halibut as a function of the location of the halibut and their size. In the case of mercury, of course, FDA does have its guidelines.

With this information, we have been able to work with the industry such that they now take fish only as prescribed and in accordance with the findings that we have made about the location of mercury in the fish.

Senator HOLLINGS. I am talking about the industries that are causing the mercury contamination. What have you done with that industry?

Dr. WHITE. I don't know what has happened in that particular case, Mr. Chairman.

Dr. ARON. I don't believe in the case of Alaska there was an industrial effluent problem. If you look at the distribution of mercury in the halibut, the amount of mercury actually increases as you go south in terms of the fishery. Now, we don't really understand—

Senator HOLLINGS. I thought down around Seattle and all it was clear, but right in the area there it was concentrated, and the Canadian fishermen found it the same way. That was my memory from those hearings.

Dr. ARON. If we could report on this for the record, we would be glad to.

Senator HOLLINGS. We will leave the record open, and I will appreciate any finding that you made, or any action that has been taken.

[The following information was subsequently received for the record:]

DISTRIBUTION OF MERCURY IN PACIFIC HALIBUT

NMFS has conducted a detailed analysis of the mercury content of halibut in relation to size of fish and location of catch. Samples of edible flesh were analyzed from over 1200 fish or various weight classes that were caught in areas from the Bering Sea to off the coast of Oregon. The study showed that mercury content increased progressively in halibut caught in more southerly latitudes. For example, less than 5 percent of the halibut caught in the Bering Sea contained more than 0.5 ppm of mercury whereas 38 percent of those caught off Washington and Oregon exceeded 0.5 ppm mercury. The study also showed that mercury content increased progressively as fish size increased. For example, in the Gulf of Alaska, fish in the 0 to 60 pound weight class had an average mercury content of 0.1 ppm with only one out of 377 samples exceeding

0.5 ppm. On the other hand, fish weighing more than 150 pounds from this area had an average mercury content of 0.3 ppm with 18 out of 58 exceeding 0.5 ppm. These data have been utilized by industry to develop management practices which minimize harvesting halibut with a high mercury content.

HALIBUT ASSOCIATION OF NORTH AMERICA,
Seattle, Wash., May 1, 1972.

Dr. MAYNARD A. STEINBERG,
Director, Technological Laboratory, National Marine Fisheries Service, Seattle,
Wash.

DEAR DR. STEINBERG: For your information, I am enclosing copy of Halibut Association of North America's bulletin dated May 1, 1972 concerning procedures for handling and testing Halibut for the 1972 season.

Sincerely yours,

RUFUS A. LITTLEFIELD, *President.*

Enclosure.

To: All members of the Halibut Association of North America.

GENTLEMEN: Last July our Association presented the Food and Drug Administration a plan which our members proposed to follow in an effort to minimize the possibility of Halibut being marketed in the United States which contained Mercury in excess of Food and Drug guideline tolerances. Although the statistical data and any other information on the subject of Mercury in Halibut was very slight at that time, the plan seemed to work quite well. Food and Drug seemed to be reasonably well satisfied with our program and just as important we avoided getting any great amount of poor publicity through the news media.

As a result of our testing program last season and with the cooperation of Food and Drug and with assistance from the National Marine Fisheries Service, we have more data and information to work with during the coming season.

Also our last season's program was modified two or three times by subsequent bulletins. Because of this we feel that our plan should be updated.

Our Committee met with Food and Drug officials on April 14, 1972. Our Committee also met April 25, 1972 and developed the following plan for the coming season:

1. RESTRICTION OF SIZES OF HALIBUT

A. *Areas III and IV* (except Cape Fairweather and Cape Spencer). No restrictions on sized Halibut which dealers will buy.

B. *Cape Spencer and Cape Fairweather*: The maximum sized Halibut acceptable to buyers will be 100 pounds.

C. *Area II* (except Cape Cook and South). The maximum sized Halibut acceptable to buyers will be 100 pounds.

D. *Cape Cook and South*: The maximum sized Halibut acceptable to buyers will be 60 pounds.

We are aware that the Canadian Fisheries Department has withdrawn their size restrictions for Halibut delivered to Canadian ports by Canadian boats. Regardless of this our Committee recommends that the same size restrictions that we had last year be continued.

Statistical data which has been compiled indicates that a high percentage of Halibut 100 pounds or more out of Area II (and Cape Spencer and Cape Fairweather) contains over 0.5 ppm Mercury. Because of this we strongly recommend that our members do not accept Halibut over 100 pounds out of Area II on any basis, whether it be purchased outright, on consignment subject to inspection, or for the fisherman's account, or on any other plan. However, if you do decide to take Halibut over 100 pounds (over 60 pounds from Cape Cook and South), the Halibut must be tested on an individual fish by fish basis and only the fish testing under 0.5 ppm Mercury may be sold on the American market.

We feel that by taking the fish on any basis will—

1. Jeopardize our program in that the fish may get on the market, be discovered, and be publicized.

2. By taking the fish may cause Food and Drug to increase their surveillance of the fish and the plants accepting the fish.

Food and Drug has re-confirmed that their position on Mercury has not changed and if we can not effectively manage the program through our Association that they will have to become more active in policing the problem.

2. SAMPLING AND TESTING PROCEDURE

A. All fish received from Areas III and IV weighing over 100 pounds must be tested by a qualified laboratory for Mercury content.

B. Fish will be tested by lots and Food and Drug Regulations concerning lots and sample sizes will prevail. Copy of these regulations attached.

C. If a lot tests 0.4 ppm or less, the lot may be marketed. If the test results are between 0.45 ppm and 0.49 ppm the lot should be re-tested twice.

If the average of the three tests is 0.49 ppm or below, the lot may be marketed provided no single analysis is 0.5 ppm or greater.

Any lots found to contain 0.5 ppm Mercury or greater, must be sampled on a fish by fish basis and any individual fish found to be under 0.5 ppm may be marketed.

C. Any fish testing 0.5 ppm Mercury or greater, must not be marketed in the United States market.

All lots of fish in the over 100 pound size category must be tested.

Size graduations to be used when testing Halibut should be as follows: 60 to 80, 80 to 100, 100 to 125, 125 to 150, and 150 and up.

D. More care must be taken in filling out the Halibut Data Sheets used for reporting results of testing. If needed, additional Halibut Data Sheets may be obtained from the Halibut Association's office.

3. EXPORTING HALIBUT CONTAINING OVER TOLERANCES OF MERCURY

A. Halibut containing 0.5 ppm or more must either be retained by the owner or disposed of by a method approved by the Food and Drug.

B. Food and Drug will allow over-tolerance Halibut to be exported under the following provisions:

1. The buyer of the fish must be advised regarding the Mercury level in the fish.

2. The seller must have a written statement from some one in Government authority stating that country's position on Mercury tolerances.

3. The shipper must furnish the Halibut Association or the Food and Drug copies of all documents of sale, bills of lading, etc.

4. APPROVED LABORATORIES AND APPROVED METHODS OF ANALYSIS

To reduce discrepancies in the findings of various laboratories, the Association strongly recommends that whenever possible that testing be done by Laucks Testing Laboratory; Food, Chemical and Research Laboratory, Inc.; or the New England Fish Company's laboratory.

It will also be necessary that the Association develop a plan whereby cross checks may be made of the laboratory being used to make certain that like results are obtained from each laboratory.

Please sign and return the enclosed acknowledgment form which will indicate that your company received Halibut Association of North America's bulletin dated May 1, 1972 regarding procedure for handling and testing Halibut for the 1972 season.

Your Committee hopes that your fine cooperation will be continued.

SAMPLING PROCEDURES

I. For packaged, labeled lots of processed product.

A. A lot usually consists of one code. There may be exceptions.

B. The sample size is the square root of the number of cases in the lot. Example: The sample from a lot of 25 cases is 5 cases; the sample from a lot of 100 cases is 10 cases.

C. A sub-sample is taken from each case in the sample. Two sub-samples will consist of at least one pound from each case. In a lot of 25 cases, 5 cases would be pulled as a sample, and each case would contribute 2 to 4 steaks as sub-samples.

D. In the example above, each sub-sample would maintain its identity throughout. For analysis all the steaks in a sub-sample would be composited. There would be 5 analyses on a 25-case lot.

II. For fresh or frozen fish.

A. In general, samplers prefer to draw samples from fresh or frozen fish. This is not a rule.

B. A lot of fresh or frozen fish is less clearly definable than is a lot of packaged fish. If the fish can be identified as coming from a particular vessel, they may be considered to be one lot on that basis.

C. The size of a sample of fresh or frozen fish is based on the weight of the lot. Lot sizes and sample sizes are related as follows :

Lot size (pounds) :	Sample size
0 to 1,000-----	4 5-lb. samples.
1,001 to 5,000-----	1 5-lb. sample.
5,001 to 15,000-----	2 5-lb. samples.
15,001 to 25,000-----	3 5-lb. samples.
25,000 plus-----	1 5-lb. sample for each 5,000 lbs.

D. Samples from large fish are usually obtained by cutting pieces from fish taken at random.

E. Samples are analyzed as composites of 5 pounds (probably 3-8 pieces of fish), each of which maintains its identity throughout the analyses.

Senator HOLLINGS. Go ahead, Dr. White.

Dr. WHITE. Mr. Chairman, thus far I have described briefly some of man's activities impacting the ocean environment and some of the pollutants of global concern. Although the short-term effects and more localized consequences of ocean pollution are sometimes apparent to us, as yet we really know relatively little about the longer term consequences. Additionally, in many areas we may not know enough to separate the real from the nonproblems.

These are the basic issues we face :

1. How do the effects of man's activities relative to natural events affect the ocean, not only locally, but on a regional or even global basis?

2. How do various effects interact?

3. Are we contributing substances that could cause unwanted and even irreversible long-term effects—either on a regional or global basis?

As difficult as it is to understand these larger effects, it is extremely important that we do so. The gaps in our knowledge of the ocean will not be easy to fill. We are dealing with complex and long-term phenomena.

Our scientists, for example, understand acute toxic effects of many contaminants on marine organisms reasonably well. They know much less about low-level chronic effects, which through alterations in spawning, migration, or other behavior, may take their toll over a period of several generations.

Then, too, we have sometimes confused natural or cyclic phenomena with man's impact. We certainly have a clear responsibility to identify problems impacting the environment which are due to man's involvement, and these are often subtle changes. But we must also be able to say which changes are naturally occurring.

A few years ago, for example, there was great concern over proliferation of crown-of-thorns starfish, which were destroying coral reefs. It was thought this may have resulted from man's interference with the ecosystem. It is now generally accepted that this was a natural condition. There is evidence that this has happened in the past, though we don't know why. We now believe nothing in the way of manmade causes was involved.

The mercury situation in certain fish species is another good example. It was only too apparent that the cases of mercury poisoning in Japan were due to discharge of industrial mercury. We do know, however, that by far the largest proportion of mercury in the oceans is from natural sources. And examination of specimens in the Smithsonian Institution and of archeological specimens dating thousands of years ago, shows the mercury content of many fishes has remained the same over thousands of years. This illustrates the importance of attempting to understand when phenomena are natural, which are man-induced, and over which we have some control.

We must do a better job of understanding the marine environment if we are to both safeguard and utilize it over the long run. We must begin to address the long-term effects of man on the oceans through studying the basic processes and dynamics of the ocean and atmosphere in relation to these effects.

I would like to cite one example. Let me talk about oxygen concentrations in the atmosphere. For example, phytoplankton in the ocean are prime sources of oxygen in the atmosphere. In the 1960's, it was reported that insecticides and herbicides were widely dispersed in phytoplankton, raising the question of whether these substances would inhibit photosynthesis and its associated oxygen production. It was thought that through time this could possibly reduce oxygen levels in the atmosphere.

A joint project, with scientists and ships from NOAA's predecessor, ESSA, was set up to measure oxygen over the world. Atmospheric samples were collected in 1967 and 1968 from the coastal and ocean open waters and analyzed by scientists at the National Bureau of Standards.

Careful measurements showed no measureable difference between values measured in 1910 and those from 1967-68. In short, the inhibition of oxygen production was not found to be a global problem at the time.

But it took more than 4 years, 1966-70, and a major investment in ships, men, analytical techniques, to demonstrate this. Further, the basic concepts were already understood. For many problems of such global significance, the political threat to the environment is poorly articulated, the basic processes involved are unknown, and little time or resources are available to provide answers.

This question on the oxygen levels of the atmosphere was proposed and answered in a thoroughly responsible way. We believe that the findings served to allay serious public concern. We must apply this approach to other problems of global magnitude, if we are to answer some of the questions legitimately troubling the public. And we must mount such programs with adequate leadtime, to be in a position to provide information when the problems arise—not after concern has reached a fever pitch.

With this in mind, NOAA is participating in a number of wide-scale marine environmental studies. These include:

1. A marine ecosystems analysis project, which we have already discussed, designed to understand the dynamics of the New York Bight and man's impact on that system. This may be the most comprehensive study of its kind ever undertaken.

2. The international field year for the Great Lakes, a joint United States-Canadian program to study the dynamics of Lake Ontario, which will lead to improved understanding of all the Great Lakes.

3. The global investigation of the pollution of the marine environment is a recently initiated program under U.N. auspices.

A panel of NOAA scientists will discuss these studies with you tomorrow.

Mr. Chairman, that concludes my presentation. I would point out that the Marine Protection, Research and Sanctuaries Act of 1972 directs the Department of Commerce, acting through NOAA, and in cooperation with other Federal agencies concerned, to undertake a continuing and comprehensive program of research on the long-term effects of man on ocean ecosystems. It calls for us to report on the findings of this program to the Congress annually. The first report is due next January, and we hope to be able to provide the committee with a more detailed appraisal of the situation at that time.

I will now attempt to answer any questions.

Senator HOLLINGS. I went home for a sunny weekend, and we had 16 inches of rain. You are in charge of the weather bureau, too, aren't you?

Dr. WHITE. Yes, Mr. Chairman.

Senator HOLLINGS. Dr. White, in connection with the statement, let me ask one final question about the international cooperation and interplay between the United States and other nations now in this field of research, and ocean pollution concerns.

What can you tell us about that? Are we just doing our own program, and trying to clean our own waters? There are seven seas; what is being done around the world?

Dr. WHITE. Sir, I think there is a worldwide consciousness of this problem. It was fairly pointed out last year at the United Nations' Conference on the Human Environment, at Stockholm. This led to the Convention on Ocean Dumping which was signed in London, I believe, earlier this year, or late in that year.

There were programs proposed at Stockholm, and incidentally I will be leaving today for Geneva, to discuss those. They call on UNESCO, through its Oceanographic Commission to bring nations together collectively to do much, more about monitoring pollution conditions in the ocean.

Tomorrow, one of our panel members will discuss this aspect of cooperation on studying the marine environment. I believe you will have the Director of the National Science Foundation testifying later this morning. Although I have not seen his testimony, they are responsible for the International Decade of Ocean Exploration, and one aspect of that program is a program for baseline measurements of the chemical condition of the ocean which would lay a fine base for our knowledge of general pollution conditions in the ocean. This will be done cooperatively with the other nations.

So I think there is a growing recognition on the part of the nations of the world that we have a serious problem. In local areas that concern has grown rather intense. For example, the Mediterranean Sea is highly polluted today, and the nations surrounding the Mediterranean Sea, I just read in the newspaper have gotten together at Beirut this last week to decide what actions those nations can take to arrest pollution there.

So I think we will have significant cooperation from the nations of the world.

Senator STEVENS. Doctor, you mentioned your studies in Alaska related to Prince William Sound. Do you have any timetable for those studies?

Dr. WHITE. I can't give you one at the moment, Senator Stevens, but I will be able to give you that for the record, sir.

Senator STEVENS. I would be very interested to see how that ties in with the projected construction scheduled for the trans-Alaska pipeline.

[The following information was subsequently received for the record:]

The NOAA studies of hydrocarbon effects upon the marine resources of Prince William Sound are presently underway under the direction of the NMFS Auke Bay Laboratory. These integrated studies (laboratory and field) include determination of the effects of various hydrocarbons on the survival, behavior, physiology, and migration of the fish and crab resources of the Sound. The information obtained will provide an insight to what might be anticipated as a result of the development of the transshipment facilities at Valdez.

In addition, we have initiated a NOAA-National Bureau of Standards cooperative chemical baseline study of the present level of aromatic hydrocarbons in the sediment and living resources of Prince William Sound and its seaward approaches. (Analysis will be conducted on clams, mussels, limpets, algae, crabs, and fish as well as the sediment at a series of sampling sites and during different seasons.) This project was initiated in June 1973 with completion expected in mid-1974.

Establishment of the aromatic hydrocarbon concentrations within these organisms and sediment will provide knowledge of the pre-pipeline conditions. Monitoring programs of hydrocarbon levels following construction of the Trans-Alaska Pipeline System can then be related to these baseline data.

Projects being planned and proposed to be initiated prior to the completion of the Trans-Alaska Pipeline System are comprehensive ecosystem studies of both Prince William Sound and northern Puget Sound analogous to the study currently being conducted in New York Bight, and the determination of baseline hydrocarbon levels at selected shore stations along the marine leg of TAPS.

Senator STEVENS. You also mentioned you were going to do surveys, I understand, in answer to questions that Senator Hollings raised concerning the samples that you described.

You said you were going to take samples on the west coast and Alaska.

Are those the ones to be done in Prince William Sound?

Dr. WHITE. If I could turn to the Director of Research of the Marine Fisheries, Dr. Royce, perhaps he might be able to comment on that.

Dr. ROYCE. Mr. Chairman, the Auke Bay Laboratory is engaged in baseline studies, finding out what is the current condition in Prince William Sound in the vicinity of the proposed terminal, and these studies we expect will be integrated with more comprehensive studies in the rather near future, within the next couple of years.

Senator STEVENS. How are you going to do the Alaska study?

Dr. HIRSCH. They are not directly identical to the ones in the New York Bight, Senator. The studies in Prince William Sound are to provide a baseline for conditions that exist there now with respect to oil contaminants, so should the Alaska pipeline come into practice, we would be able to see whether any cumulative effect is occurring.

Senator STEVENS. You would be able to monitor it as it goes along to see if the reports provided on the operation of the pipeline are consistent with your findings with the situation that exists today?

Dr. HIRSCH. Yes, so far as the concentration of oil in marine organisms. I think it is important that that get done now so we have a record of what conditions are, before any operation.

Senator STEVENS. Those are the studies to be done in the next 2 years?

Dr. HIRSCH. Yes.

Senator STEVENS. Thank you very much, gentlemen.

Dr. White, I am very disturbed about the recent incident, again, where foreign fishing fleets have slipped their nets in the waters off Alaska, 14 nets, I understand, slipped off those two Japanese fishing vessels, and I have pieces of them, now, that have been brought in, and they are the monofilament nets.

What is the technical word for it, they don't decompose? And they are nothing but marauding killers in the oceans, as I understand it.

Now, have your people ever done any tests concerning the effect of nets such as these, on the fishing stocks of the North Pacific?

Dr. WHITE. I don't think so, but perhaps, there is something going on. Perhaps Dr. Royce might know.

Bill, are they going to do any tests on the monofilament nets?

Dr. ROYCE. Senator, I am not aware of any current studies, but we have made studies over the past years comparing the catching ability of monofilament nylon nets, and the conventional nylon, or linen nets which had been in general use in Alaska. The monofilament nets are unquestionably much more efficient for catching salmon, and as you say, they do not deteriorate for a very long time if they are lost in the water.

Senator STEVENS. I think we have to do something about making some recommendations when we are in Geneva about this, because the people I talk to in the fishing industry—if they are correct—these nets, if they slip off foreign vessels, just continue to fish in Alaska waters, and they will catch a school of fish, they are not discriminating in terms of closures and protections, or anything.

They just wander forever, and as soon as the fish that are caught decay, they will float on, as we understand it. Unless there is some way we can get the international community to ban these nets, I think we are going to have to take some rather strong action to ban them in any waters adjacent to our fishing waters.

We don't allow our fishermen to leave American shores with such nets onboard, and yet we find in this instance that if it had not been for the one plane, and I don't know whether you heard about this Senator, if it had not been for the one plane that spotted them, those 14 nets would have been there forever.

I can't understand how we can have a situation like that developing when we are talking about the concepts of pollution. Here it is not only pollution, but it is a lethal form of pollution to all the marine life, seals, whales, or anything else that might get caught into those, as I understand it.

They would die. We seem to be just crying out in the wilderness. Everyone is telling us what to do in Alaska, and we point out the worst possible form of pollution is something that will kill fish and here the foreign fishermen are bringing them in.

The CG finds them; but I would urge you to do something about demonstrating the lethal effects of these nets and assist us in the Law

of the Sea Conference to try to have an absolute ban on the use of these nets in the worldwide fishing community.

There are going to be some serious repercussions in Alaska if we can't find some way to stop this.

Senator HOLLINGS. Is the law inadequate in this regard?

Dr. WHITE. There is no authority for dealing with it. Now, pursuant to some international agreements, we do have gear agreements. The gear agreements have never gone to this particular question. The problem is a serious one. As I pointed out in my testimony, we find these nets washed ashore on the Aleutian Islands, and they are pretty widespread.

You know, I agree, we ought to try to do something and your suggestion for looking at what these nets do to the stocks is something that I will take very seriously, and I would welcome the opportunity to get back and talk to you about it.

Senator STEVENS. I think we ought to try to suggest to the world community that these nets be tagged, so we can know what vessels they are off of, if we ever find them. We have to put up with the hazards of a sea, and a vessel that is wrecked might lose equipment; but when they intentionally slip them, when they are inside Alaskan waters, they are burglars, and ought to be treated as such.

I don't think we even require our own nets to be marked so that they can be identified.

Dr. WHITE. That is a correct statement. We do not.

Senator STEVENS. We are working on legislation along that line, now. I see no reason to permit these implements of real long-term pollution to exist; of course, ours do decompose after a couple of seasons, I understand.

Dr. WHITE, is that how long a net would last, two seasons?

Dr. ROYCE. I believe the practice is to replace them after two seasons. They might last substantially longer than that, but the fisherman is interested in having a net with no holes at all to be as efficient as possible. We have remnants lasting for many years.

Senator STEVENS. One that was cut loose, though, would decompose after a reasonable period of time, it is my understanding, whereas these monofilament nets would not.

Dr. ROYCE. I believe not, sir; because they are both made of nylon as a rule. The multifilament nets are still made of nylon, and quite resistant to rotting.

Senator STEVENS. Don't we still require a section of fiber of so many feet in a net that is going out from an American port?

Dr. ROYCE. I am not aware of that.

Senator STEVENS. Well, we used to, and we were assuming that that was still continuing. Most of these nets are coming up to us from Washington. Most of the large nets are coming in from the west coast ports into Alaska waters, and we have been assuming that they still have the requirement that every so many feet they would have a portion of the net that would decompose, so the nets would come apart.

Would you look into that for us?

Dr. WHITE. I would be glad to.

Senator STEVENS. We can do that with legislation in Congress, if it is not being done still.

Thank you.

Senator HOLLINGS. Dr. White, we appreciate your appearance and your associates here this morning.

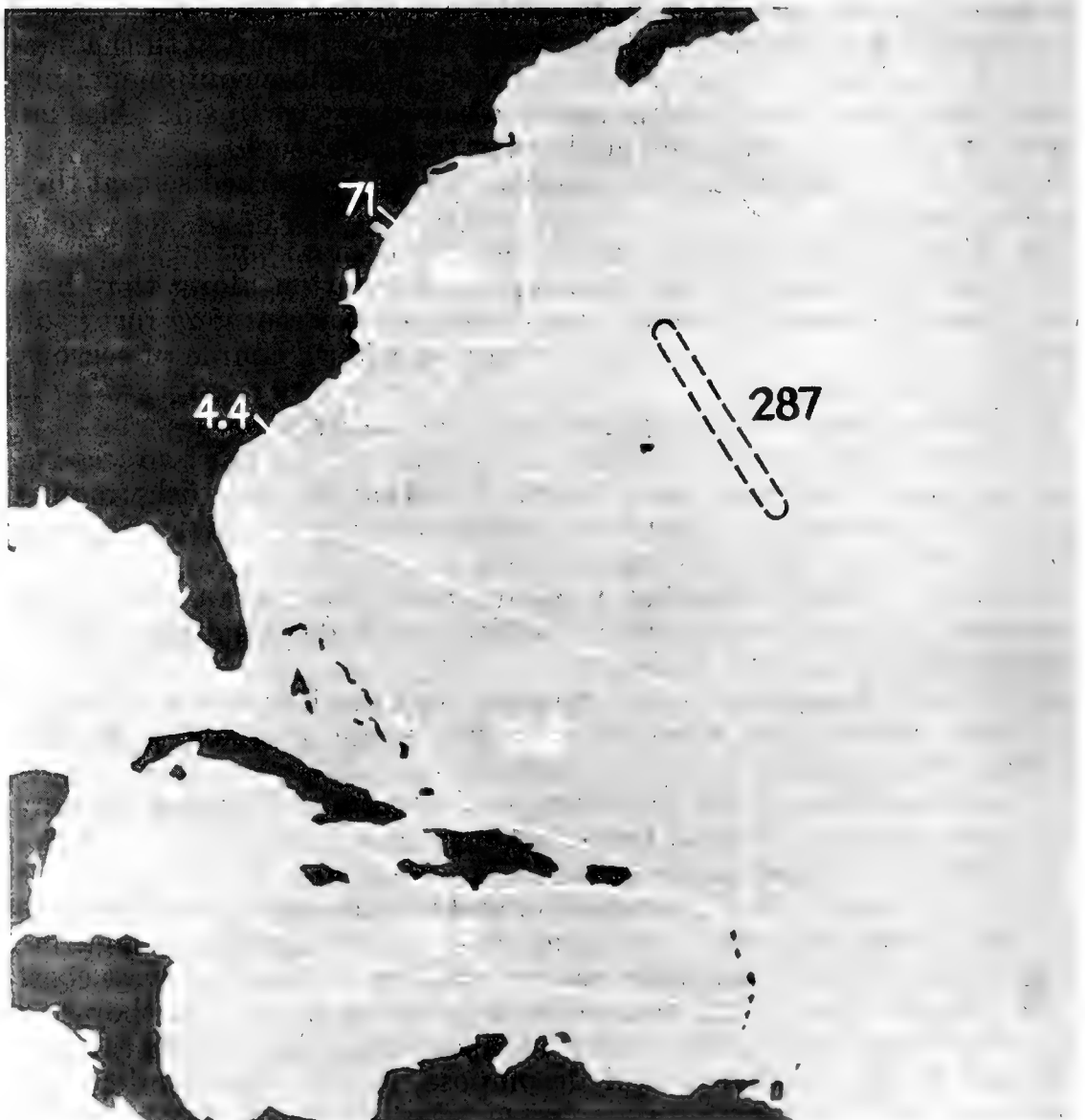
You have been of great help to us.

Dr. WHITE. Thank you.

[The following pictures were subsequently received for the record:]

AVERAGE DENSITY OF PLASTICS GM/KM²

OTHER SURVEYS, OCTOBER 1971



AVERAGE DENSITY OF TAR GLOBULES MG/M²

OTHER SURVEYS, 1969-1972



Senator HOLLINGS. The next witness will be Dr. Guyford Stever of the National Science Foundation.

STATEMENT OF DR. H. GUYFORD STEVER, DIRECTOR, NATIONAL SCIENCE FOUNDATION; ACCOMPANIED BY DR. THOMAS OWEN, ASSISTANT DIRECTOR FOR NATIONAL AND INTERNATIONAL PROGRAMS

Dr. STEVER. Mr. Chairman, I am Science Adviser, but not Science Administrator to the President.

Senator HOLLINGS. You are science adviser to whom?

Dr. STEVER. To the administration, the White House.

Senator HOLLINGS. I don't want to start making any differences there. We have to keep this down to ocean pollution.

You may proceed, and we appreciate hearing from you at this time.

Dr. STEVER. Thank you, Mr. Chairman, and members of the subcommittee.

I appreciate your invitation to appear before this committee as part of your symposium on ocean pollution to discuss the work of the NSF related to that topic.

Dr. Thomas Owen, who is the Assistant Director for National and International Programs at the NSF is here with me. He has the principal responsibility within the NSF in the field in which you are concerned, although work is going on in two of our other directorates, the Assistant Director for Research has some basic research work in this area, and the Assistant for Research Applications has some work. Dr. Owen can answer questions in all three areas.

Not until recently has the Foundation supported activities directly related to the problems of pollution control and abatement. Through its basic research project grants to universities and oceanographic institutions, the Foundation for many years has supported a wide spectrum of studies that contribute to our understanding of the oceans, coastal areas, and estuaries.

This includes research projects in physical, chemical, biological, and geographical oceanography and in atmospheric science that are important to the overall pollution study effort. Presently there is work underway which relates to the establishment of pollution baselines and to sources, transfer routes, and biological effects of pollutants found in the ocean environment.

I might also mention at this point that NSF provides the lion's share of support for the operation of the academic oceanographic fleet used by oceanographers in pursuit of much of their work.

Senator HOLLINGS. At that particular point, Dr. Stever, do all our sea grant programs in the oceanographic research vessels provide the lion's share of the academic oceanographic effort?

Dr. STEVER. Yes.

Senator HOLLINGS. Elaborate on that, would you?

Dr. STEVER. Yes. By law, you know the NSF can do no research in its own laboratories. It has no laboratories. It owns some national centers, but they are operated by others. So, we make grants, and most of our granting is to academic institutions, or to other institutions such as Woods Hole.

By agreement within the oceanographic community, with NOAA and with the Navy and others, the NSF handles most of the support of the academic oceanographic fleet. We support the ships at Scripps Institution of Oceanography, at Texas A. & M., and so forth.

Senator HOLLINGS. Approximately how many ships are involved?

Dr. OWEN. Senator, the NSF contributes to the support of 32 ships, ranging in size from 50 to 250 feet, at 17 different operating institutions. We contribute to their operational support, sir.

If one totals the cost of operation of the academic oceanographic fleet, one finds that the NSF provides for somewhere between 65 and 75 percent of its annual operating cost, with the Navy providing 20 percent and the other agencies of the Federal Government and States providing the balance.

Senator HOLLINGS. For the ensuing fiscal year of 1974, will you be cutting back on those research grants and research vessel operations, or not?

Dr. OWEN. The NSF's contribution to the support of the fleet will be slightly less, yes, sir, than that provided in fiscal year 1973, but the support by other agencies is substantially less.

Thus, there are problems in maintaining the size of that fleet in fiscal year 1974.

Senator HOLLINGS. NOAA is having to lay up four or six research vessels.

Dr. OWEN. That's correct, sir.

Senator HOLLINGS. And you are going to be having to diminish some of your support to the academic community for the research vessels, is that correct?

Dr. OWEN. Yes. We have balanced the amount for oceanographic research against required ship time. We are trying to balance out the situation as best we can so that the work is done with the least penalty to the operating institutions.

Senator HOLLINGS. Is there any coordination between NSF and NOAA?

Dr. OWEN. Yes, sir, and with the oceanographer of the Navy as well. The three agencies being the principal funders do work very closely together. I contact and talk with Dr. White very frequently and with Admiral Snyder, the Oceanographer of the Navy, sir.

Senator HOLLINGS. Thank you.

Dr. STEVER. May I add that Dr. White is chairman of an interagency committee for the coordination of our oceanography, not only in this area, but in others.

Much of the research supported by the NSF in the atmospheric sciences, Earth sciences, and oceanography, contributes in one way or another to our knowledge of pollution.

As examples, I would mention that observations of atmospheric circulation and ocean currents, the making of standard measurements on sea water, and the analysis of water and marine life for chemicals all contribute to the broad but important collections of data necessary to understand pollution problems.

There is a growing concern that the dispersal of pollutants is becoming worldwide. Once a substance that is considered a pollutant has been produced—either by man or by natural processes—unless it is contained at its source, it inevitably finds its way into the general environment which includes the oceans and their ecosystems.

Some substances enter the ocean through river runoff, others via the winds, while still others are injected into the ocean more directly—for instance, when a tanker breaks up at sea or directly pumps its bilges and tanks.

Although the concentration of these pollutants tends to diminish with distance from the industrial centers of the Northern Hemisphere, their presence throughout the oceans is now feared to be inevitable.

In 1965, DDT was found in marine animals in Antarctica, long considered the last "uncontaminated" area in the world. In fact, DDT has been found in snow high on the crest of that continent—about 12,000 feet above sea level and thousands of miles from any populated area. Whether it was carried there by wind and ocean circulation or by men and equipment is not yet clearly established. That this manmade chem-

ical compound has been found in the most remote regions of the earth is, however, a matter of great interest and concern.

I should like to interject a thought here that one should be very cautious. As interest has grown in pollutants and their distribution throughout the world, so has the capability of science to detect these compounds. The instruments used today are overwhelmingly better than they were a few years ago, so one should not panic completely, because we can now detect them. The real problem is measuring the amount and their coverage.

The technology of instrumentation is improving to do the job which is obviously before us to measure these things all over the world.

I should now like to discuss some of the work supported by the NSF that is related to ocean pollution. A substantial portion of the research carried out under the auspices of our International Decade of Ocean Exploration (IDOE) is directed toward the preservation of the quality of our marine environment.

Thirty-two nations are contributing to that program, and NSF is the responsible agency in this country.

In 1971-72, the IDOE sponsored an intensive program of baseline measurements at sea of the concentration of compounds that are considered potentially deleterious to man or to marine life. Quantitative measurements have been made of the occurrence and distribution of trace metals, chlorinated hydrocarbons, polychlorinated biphenyls, and petroleum in sea water, in the biota, and in sediments.

The study confirmed the readily identifiable presence in many open ocean organisms of synthetic chlorinated hydrocarbons (such as PCB and DDT and their metabolites) and petroleum hydrocarbons.

These baseline studies provided data indicating the need for further research on two important topics: The entry of pollutants into the ocean, and their effects on marine biota. Among these efforts directed to pollutant dispersal are studies of the mechanisms and rates of entry into the oceans by way of river runoff and fallout from the atmosphere.

Measurements of petroleum concentrations in the North Atlantic will help trace the sources of these materials. With regard to the effects of pollutants on marine biota, experiments at the molecular level have been started to determine the effects which certain compounds have on the rate of reaction in key enzyme systems.

Studies are being conducted on the ability of marine bacteria to carry out, in the presence of pollutants, their vital function of decomposition—a major step in the recycling of nutrients. At the individual organism level, the impact of pollutants is being studied in both plants and animal types.

For example, the effects of pollutants on photosynthetic microalgae are being determined through measurements of growth, respiration and photosynthetic rates. In zooplankton and higher forms, pollutant effects are being tested on vital processes such as metabolic rates.

Finally, the impact of pollutants on marine communities is being studied in an IDOE program carried on as a joint effort by scientists from four U.S. universities, and from institutions in Canada and the United Kingdom. This program is known as CEPEX—the Controlled Ecosystems Pollution Experiment.

The goal of CEPEX is to evaluate the effects of pollutants on the lower levels in the food chain, particularly bacteria phytoplankton and zooplankton. CEPEX scientists are constructing flexible plastic cylin-

ders made of heavy nylon-reinforced polyethylene, which will be used to isolate large volumes of ocean water for study.

These cylinders, 7 feet in diameter and 27 feet long, will be suspended vertically in a storm-protected sea area. They will be closed at the bottom and open to the atmosphere at the top. Communities of natural sea life—aglae, plankton, et cetera—will be retained in the cylinders in their natural state.

During the experiments, measured amounts of pollutants will be added to some of the cylinders while the others will be retained as controls for comparison.

In this way, the effects of the pollutants on the various organisms can be observed and compared with the living forms in the isolated community to which no pollutants were added. Special attention will be paid to the changes in populations of species and, in this way, those portions of the marine food chain which are critical links in the way the ocean responds to pollution will be detected.

The Geochemical Ocean Sections Study —GEOSECS—aims at establishing present concentrations of a large number of chemical elements and compounds in the deep water of the ocean. While the primary goal of GEOSECS is to understand ocean circulation and mixing, the data also bear on the problems of ocean pollution.

For example, the present-day concentrations of fission-product radionuclides are being established for the Atlantic and Pacific Oceans. But, most important, the new insights which these experiments will provide on the rates of mixing of ocean waters will be very useful in developing methods to calculate dilution rates for ocean pollutants.

Projects supported by the Foundation's program of research applied to national needs—RANN—involve planning for the prevention of environmental degradation in coastal areas and developing new techniques for managing coastal environments.

There are several categories of these projects. One set of projects is typified by the coastal zone workshop held 1 year ago at Woods Hole, Mass. At this workshop, panels of experts outlined critical coastal problems, examined and evaluated available information about them, and recommended research needed to achieve an understanding of contamination in coastal waters.

At a similar meeting, State legislators and attorneys general from 32 States considered problems related to the integration of State legislation and the Federal Coastal Zone Act, reviewing current laws and programs in force in the coastal States. The National Science Foundation is particularly pleased to have been able to assist in this effort of encouraging communication and coordination at State and Federal levels.

Other projects funded through RANN programs are designed to assist in the planning of shoreline developments in order to reduce the likelihood of environmental deterioration. One such effort, coordinated with the EPA, is a study at the University of Oklahoma of the potential environmental consequences—together with the regulatory and legal issues—of future offshore oil production.

Another study, carried out in Texas, is developing operating criteria for coastal-zone management that will minimize the destructive effects of man's activities, develop methods of processing wastes discharged into coastal waters, and establish water quality criteria for maintenance of life in bays and estuaries.

Coastal zones are the spawning and nursery areas for many valuable species of marine organisms. These portions of the coastal zone also are increasingly fouled by pollutants that adversely affect marine life. Studies of Delaware Bay and Chesapeake Bay supported by the Foundation are directed toward achieving greater knowledge of pollutant effects on fish and shellfish and toward seeking information on domestic and industrial wastes. An additional objective is to enhance the ability of enforcement agencies to devise necessary pollution control strategies for the coastal areas.

In one experimental project underway at the Woods Hole Oceanographic Institution in Massachusetts, researchers are successfully stripping the nitrogen and phosphorous nutrients from human wastes. In this project, an algal culture is grown in sea water enriched with the effluents from a secondary sewage treatment plant, after which the algae is fed to oysters and other shellfish species.

Selected seaweeds, such as Irish moss and kelp, are used to convert much of the liquid waste from the oysters into usable products. Abalone also live on other plant and animal life which feeds on the liquid waste from the oysters.

The solid wastes from the oyster tanks feed a great variety of marine worms that are, in turn, used as food by marine fishes which are of value as human food. We believe there is a potential in this study for ways to reduce the estuarine discharges of sewage wastes from small communities, thereby reducing the biological overburden on the coastal waters as well as easing the esthetic problems produced by sewage in these regions—and, perhaps, helping produce more oysters for those who like them.

Antarctica and the surrounding oceans—because of their remoteness and isolation from the industrialized and heavily populated Northern Hemisphere—afford a unique opportunity for monitoring chemical and biological pollution. It would be a key area if a worldwide network of pollution monitoring stations were to be established. Considerable attention has been devoted to the problems of pollution and environmental conservation under the Foundation's U.S. Antarctic research program.

Project support for pollution-related research is also provided through the Division of Environmental Sciences. Although the origin and motivation for many of these studies may not have been ocean pollution, they do produce insight into processes bearing on ocean pollution and ocean dumping problems.

Let me illustrate by giving two examples: One is a program to measure in situ diffusion rates of chemical species from and into marine sediments at depth, and the other is a study of the dynamics of organic matter at great depths in the ocean. Both of these investigations produced some rather unexpected results.

In the first case, diffusion rates were found to be significantly lower than expected and, in the second case, organic matter at depth was found to decay very slowly, presumably because of the effects of high pressure and low temperature.

The intellectual stimulation for these studies stems from questions about mixing rates in the deep ocean and food chain dynamics in the water column. At the same time, however, it is clear that this type of information is needed to consider the disposal of presumably biodegradable material at great depths in the ocean.

These and other studies may not contribute to the solution of ocean pollution problems per se, but they do provide the necessary auxiliary data for pursuing research on pollution in a logical and rational manner.

Let me emphasize the necessity for international cooperation in these matters of global concern. They affect all of us, and the United States alone cannot make all the measurements required or hope to stem pollution by unilateral action. I am pleased to note here that cooperation with other nations is an integral part of many of the Foundation's programs, among them two that I have just discussed—the IDOE and the U.S. Antarctic research program.

Before concluding my remarks, I should like to make an observation on one aspect of pollution that is often misunderstood—namely, pollution by natural substances. Certain elements, such as metals, have recently received high public visibility as to their potential hazards to biota and to man. However, some of these are essential to life when in the proper chemical form and concentration, while others evidencing no specific benefits are believed to have been present for millions of years and life forms have adapted to their presence.

There is no evidence that the concentrations of these elements in the open ocean are being increased; suggesting that the chemical processes in the marine environment involve their removal at a rate which maintains a constant concentration.

However, the concentration of these trace elements generally increases as one approaches the areas where rivers empty into the ocean, and their source has been largely through natural erosion of the watershed.

No definitive answer can be given as to what constitutes dangerous levels of total metal content, because the chemistry is such that specific compounds of the metal must be assessed individually with respect to estimated danger levels.

In conclusion, Mr. Chairman, let me note that fundamental knowledge of mechanisms operating in the ocean has been of interest to mankind long before there was an organized science called oceanography. Our current understanding of the oceans is an accumulation of knowledge gathered over a period of time, although the rate of which we have been accumulating this knowledge has been increasing rapidly over the past decade or two.

The NSF research programs are thus contributing to the basic knowledge necessary for future planning and rational action with regard to ocean pollution.

Thank you very much.

Senator HOLLINGS. You said that panels of experts at the Woods Hole workshop outlined critical coastal problems and recommended research needed to achieve an understanding of the contamination of coastal waters.

Now, other than the recommendation, what has been done about coastal research?

Dr. OWEN. May I respond, Senator?

Senator HOLLINGS. Yes, please.

Dr. OWEN. I believe you are referring to the symposium that was conducted under joint sponsorship by several Federal agencies, the report of which has been edited by one of your witnesses due to testify this morning.

I think that as a result of this and other workshops, the Federal agencies, within the limits of resources that have been made available to them, have focused on the right types of research necessary to address problems of the coastal zone. I think that on an international basis, this and other workshops have drawn other nations into putting more of their resources into studies of ocean pollution as well.

Senator HOLLINGS. But there have been no NSF grants for research in the coastal waters?

Dr. OWEN. Oh; yes, sir. I believe Dr. Stever referred to those made under the aegis of our research applications directorate focusing on the Chesapeake Bay, and the Corpus Christi area of Texas, I believe he also referred to the grants to the University of Oklahoma studying the effects of offshore oil production on the coastal environment.

Senator HOLLINGS. Are there any new ones other than those?

Dr. OWEN. These have all been made within the last year or two, Senator, and are only now beginning to come forth with meaningful information that is being passed on to other Federal agencies. In most cases, these grants involve cooperative action on the part of the States and the regions involved so that they can get the information directly.

Dr. STEVER. May I say one word about the RANN program? It is an exploratory program. We try to take on problems that illustrate the nature of a problem. These estuarial problems are different in all areas of the country. We try to pick those that have general features. We can't handle every river estuary by itself. We try to select a few that are typical of the different kinds of problems.

Senator HOLLINGS. I know for example the special study, again in the South Carolina area around Fort Victoria, where they employ some special study group. You wouldn't have any knowledge of that, a member of PASF went in, and the Department of the Interior got involved and they stopped the location of that particular industry.

Now, the Chicago Bridge & Iron Co. has what they call a non-polluting industry which is going to cause a certain amount of deepening of the channel, perhaps, some type of dredging down there. Are you familiar with that?

Dr. STEVER. I am not. I am sorry, Dr. Eggers is not here. We did not participate in that.

From time to time we are asked by the other agencies to conduct a piece of research related to these problems, but I don't think we were in on this one.

Senator HOLLINGS. What was your position on the administration's position on the Coastal Zone Act, its lack of funding?

Dr. STEVER. The coastal zones are very important, and I think we are going to have to learn through these kinds of programs where we should concentrate our resources.

I think of the NSF as an information-generating agency so that people can better plan their programs, including the Congress and the administration.

Senator HOLLINGS. The OMB didn't consult you before the cutback on coastal zones?

Dr. STEVER. No, sir, they didn't.

Senator HOLLINGS. We appreciate you both appearing here at this time. You have been very helpful to us. Thank you.

Dr. OWEN. Thank you, Mr. Chairman.

Senator HOLLINGS. The next witness is Dr. Bostwick H. Ketchum, associate director, Woods Hole Oceanographic Institution.

Dr. Ketchum, we welcome you to the committee. We are glad to have you. We have a copy of your statement, and it will be included in the record in its entirety; you can do it that way, or you can summarize it.

**STATEMENT OF DR. BOSTWICK H. KETCHUM, ASSOCIATE DIRECTOR,
WOODS HOLE OCEANOGRAPHIC INSTITUTION**

Dr. KETCHUM. First, let me say it is a pleasure to have this opportunity to speak to you on this subject, since I have been deeply concerned with this problem for a period of 25 years, and before ecology became a household word.

There is an advantage to being the third speaker in a morning session, because much of what is in my written testimony has already been covered by Dr. White and Dr. Stever. So I think it is unnecessary to give it in detail, but I would like to highlight some of the points that I tried to make.

Senator HOLLINGS. Very well.

Dr. KETCHUM. It is encouraging that Dr. White's summary of the critical pollutants is the same as mine, although he did not mention domestic pollutants.

Senator HOLLINGS. You did not collaborate ahead of time?

Dr. KETCHUM. No, we did not.

There are three things which make these particular pollutants of critical importance in the marine environment.

The first is the total quantity in which they are produced, and the amount which might be expected to reach the environment.

The second is the toxicity of the pollutant to marine organisms and to man if it will reach him in his seafood.

And the third is the persistence of the pollutant in the environment.

Our knowledge on all of these subjects is incomplete, sometimes with regard to all three of these essential characteristics of pollutants.

For example, production statistics are frequently considered to be proprietary information which industry will not make public. This makes it difficult or impossible to make a materials balance analysis of the flow of the substance through the environment, an analysis which is essential if we are going to evaluate the impacts of different pollutants.

Senator HOLLINGS. Would you recommend to the committee any change in the laws as a result of the inability to obtain this information considered proprietary? Is it occurring in an increased amount, and such as to constitute a public problem, or public concern, or rather, from your experience, should that proprietary information remain proprietary?

Dr. KETCHUM. In terms of the total amount, I think it should be public information. There are hundreds of new chemicals being produced every year. We do not know, necessarily, what they are or what their impact on the environment will be.

The only law that I know of which allows full disclosure of this information is in terms of the FDA, which makes it available provided it is to be used for human consumption.

Senator HOLLINGS. This is in good support of the Toxic Substances Act. This committee has just reported it out—it has not come out actually, but the committee voted last week and it will be reported out and considered by the Senate, no doubt, in the next 2 or 3 weeks.

Dr. KETCHUM. Very good. I think it is an important aspect of this whole problem.

You then summarize exactly the same type of material, the heavy metals, the chlorinated hydrocarbons, the oil pollution in the sea, all of which are both produced in large quantities, are toxic, and all of which are persistent in the marine environment.

Domestic pollution is somewhat different insofar as it is essentially a natural product of human metabolism. This can be decomposed in the marine environment.

Senator HOLLINGS. What about that sludge we were talking about a little bit earlier? For example, when we put in sewage disposal and treatment facilities at the city of Charleston, and as a result, have been able to open up about a \$60 million area of oyster beds that had been closed since 1926.

What I am saying is that we have taken care of the sludge.

Dr. KETCHUM. Sewage treatment plants are aimed at reducing the total organic effluent. Much of this is decomposed in the treatment, and some accumulates in the sludge, and this sludge must also be disposed of in some way with proper treatment. Provided it does not include toxic materials from industrial wastes, it can be used as a soil conditioner, as landfill.

It is rather a poor fertilizer, but it can be beefed up with the addition of certain chemicals and make it into a fertilizing material and returned to the land, which after all, is where the major share of our food comes from, and it is this recycling to the land which should be our objective.

We also have considerable problems in the disposal of solid wastes and the problems of the persistent plastic materials which are becoming more and more common in our usage today.

That has already been mentioned by Dr. Martin.

I would like to make a few comments on the term "toxicity," however, because this is a difficult word to define and it is not always well understood.

Any substance on earth is toxic if the concentration is great enough in the wrong environment. For example, a characteristic of the marine environment is the salt content of the water, but most marine organisms can survive only within a narrow range of salinity. Estuarine organisms may not be able to survive in the open sea where the salinity is higher. Many other examples can be given.

Our concern, our greatest concern, is with those materials which are toxic or lethal in concentration in the range of parts per million or less.

I would like to refer to the table I introduced and it appears in my testimony. It is an effort to put some quantitative evaluation on the various heavy metals that are toxic and are critical in terms of being produced in large quantities and reaching the environment in considerable quantities.

Many of these metals are present in coal and oil and when these materials are burned, they are released to the atmosphere and ultimately return either to the soil or to the oceans.

I have given in this table also a column showing the toxicity of these various heavy metals. The ratio of the rate of supply to the toxicity gives the volume of water that would be raised by an annual increment of the amount presented as the toxic level by the rate of addition which is presented under the term "rate of mobilization."

This is in metric units, and perhaps it is worth bringing this in perspective in terms of what they mean in common language.

The units 10 to the 12th liters per year is really the number of cubic kilometers of seawater that would be raised to the toxic level of concentration.

I might also point out, which is not emphasized in the table, that the value given for mercury is very nearly the value naturally present in the seawater. Many others are present at much lower concentrations than these toxic levels.

To further put these numbers into perspective, one can compute the area of the ocean's surface which would be contaminated to this degree with a point source of release.

Taking the mixed depth of the ocean as 100 meters the release of mercury by the combustion of fossil fuel would contaminate a surface area of 160,000 square kilometers to a depth of 100 meters. This is equivalent to 61,500 square miles, and for interest, I looked up the area, the land area of the State of Washington—Senator Mangnuson, the chairman of the committee, might be interested in this—and this 61,000 square miles is about equal to the land area of the State of Washington. It is almost twice the area of the State of South Carolina, represented by you, Mr. Chairman.

It is clear that we are not talking about an insignificant problem from mercury, which is the most serious hazard in this regard, and even for some of the other metals there are considerable volumes or areas of the ocean which might well be contaminated by the release of these elements in the world that man is adding to the natural cycle.

In terms of the chlorinated hydrocarbons, one of our problems is that we do not know the rate at which these decompose in seawater as yet. Woodwell has made estimates that it would take over 20 years to remove 90 percent of the DDT which is at present in the ocean, and I have also quoted some data in the text on the amount of DDT and of PCB's which have recently been found in organisms living in the open sea many, many miles from shore.

Again, the units here are given in metric terms, but they correspond to parts per billion, rather than the parts per million that we were talking about earlier.

I would like to also state that there are many new synthetic organic chemicals that are being made each year, including other pesticides, detergents, and pharmaceuticals, and these are reaching the environment with impacts which are virtually unknown.

I think we can skip now to a diagram that I have presented—

Senator HOLLINGS. Before you get to that diagram, doctor, on sulfuric acid, have you got work on that? We had the threat of an ocean dump far out at sea. It was a great thing, according to a lot of scientists. In fact, they were saying that the fish got brighter and brighter, and they almost had you believe that we ought to put it in there, but when they said it did not contaminate, and you put some in a glass of water and asked them to drink it, they would not.

What is your conclusion on the dumping of sulfuric acid in the ocean?

Dr. KETCHUM. I studied this 20 years ago. This was on the acid-iron dump from the titanium plant in the New York bight. Seawater is naturally a basic solution, and it has a considerable reserve of basic materials, and within a matter of 2 to 5 minutes, the acid is neutralized and becomes a neutral salt of the sulfate ion and there is a great excess of sulfate in seawater.

We could not find any detriment so long as one took into account the natural diluting processes in the ocean. I would be——

Senator HOLLINGS. How about the heavy metals; would that have any effect?

Dr. KETCHUM. It would. I would be leary about drinking a glass if you sort of mixed it half-and-half in front of me, but I would not be leary about utilizing it in seawater—one does not drink much seawater, as a matter of fact—I would not be worried about the acidity of the seawater within 100 yards or so behind the barge that is discharging this material.

Now, this waste material in the New York bight also contains iron sulfate as the ferrous form, that is, the reduced form of iron. This is quickly oxidized in sea water to the ferric state, and we did some studies showing that this might reduce the oxygen content of the water, but again, because of the mixing, it rarely made more than about a 10 percent difference at the worst conditions we could find in the oxygen content.

Ferric hydroxide which is formed does discolor the water. It can be readily identified for many hours after the dump. It is not attractive esthetically, but on the other hand, in the New York bight if you listen to the fishermen radiowave bands, they talk about fishing the “acid grounds” today, and it has turned out to be an effective place for blue fishing.

We have tried over the course of the 20 years, since I did the original work, to see if we could explain how indeed there is better fishing there, or whether it is just an identifiable spot in the middle of the ocean that the fishermen refer to.

We have been able to find no evidence that this is of any benefit to the marine environment, but neither have we been able to find evidence that it is detrimental.

Senator HOLLINGS. Thank you, sir.

Dr. KETCHUM. This diagram which appears in my statement appears to be complicated. If so, this is because we are talking about a complex subject.

I would like to briefly run through the things that I have tried to incorporate in this diagram, which, incidentally, was prepared as a part of a research needs report for the Water Quality Criteria Committee of the National Academy of Sciences, and will presumably appear in that volume when it is published some time next fall.

It emphasizes the source and amount of the material, the supply route by which it reaches the environment, whether it is through river flow, direct discharge, or atmospheric, and its effect on the marine environment.

There is a loop in the source and amount area, called a screening mechanism. This is what I was referring to earlier, that we should have both the production statistics and the information about the

possible toxicity of these newly created materials in order to determine whether it is legitimate to dispose of them to the environment at all, or whether they should be rigorously recycled without any release to the environment.

There is a list of the type of investigations that must be made in order to evaluate the effect of pollutants in marine environment, and this little box in the middle, the synergism and antagonism is one that we know very, very little about.

If two different pollutants are added to the system, will they have an additive effect, will they interfere with each other in action on the environment, and so on? We really do not know.

There is a legitimate receiving capacity of any environment for any natural material. I am not sure that that can be extended to some of these manmade materials like the polychlorinated biphenyls and so forth. There is a natural receiving capacity which is that capacity which allows the ecosystem to recycle the material in a natural way.

This involves knowledge of the circulation, mixing of the waters, decomposition of the material and the way in which it changes. Of course, there is the problem of its possible return to man in his food.

Some of these materials get incorporated in the sediments, which may be their ultimate fate, but if they are stirred up again at a later time, as they are by dredging of harbors and estuaries, they may get returned to the system and create, again, a source of the material for future pollution.

I would like to conclude my very general statement with the remark that it is my conviction that the only ultimate solution to the problems of pollution is to recycle the material that we produce and use in our civilization. Discharging these materials to the environment is both wasteful of our natural resources, and causes undesirable impacts upon the ecosystem.

Complete recycling is probably an unattainable goal, but certainly every effort should be made to recycle materials as completely as possible, not only to conserve our natural resources, but also to prevent the further deterioration of our environment which we must preserve for the ultimate benefit of man.

Thank you, Mr. Chairman.

Senator HOLLINGS. Dr. Ketchum, is the recycling recommendation that you make a realistic one within the context of, say, the next 25 years? Could we do that?

Dr. KETCHUM. I think in many cases it is realistic. I think that if industry really devoted the attention to recycling of substances within the plant before they release it to the environment, that a great deal can be done.

This is being imposed by law in the case of mercury and in the case of arsenic, and of various other toxic materials, and suddenly they discovered it is possible to do it.

Sometime it can be done, at some expense, to be sure. But I will not be surprised when industry devotes its attention to this, if they do not make a profit out of it.

Senator HOLLINGS. In what sense would they be making a profit? I would like to sell that idea to them.

Dr. KETCHUM. Well, mercury is a very expensive element, and every bit that you waste is throwing away a certain amount of money. If

you can devise recycling techniques, every ounce of mercury you save is that much money gained.

Senator HOLLINGS. You have a long and an outstanding record in research. Now, Woods Hole, could they provide us the immediate answers to coastal zone development, or should we be looking toward the establishment of new research units?

Mr. KETCHUM. I think the coastal zone workshop that has already been referred to by Dr. Stever has been published under my editorship last October, and I trust that you will have an opportunity to see a copy of it—this was a general approach to the overall problem of both the science and the management problems that we face.

We are fundamentally a research organization, but more and more our younger scientists are becoming concerned with problems that are relevant to the environment, relevant to man's activities, and I think we have a long way to go in providing these answers, but yes, I think we can help in providing at least scientific foundation for some of the answers that are essential.

Senator HOLLINGS. We congratulate you on the outstanding leadership that has been given. Dr. White and I have been trying to get up to Woods Hole. Senator Kennedy wants some fisheries hearings up there, anyway, so maybe we can coordinate the two of them. I have always been anxious to visit that institution.

Dr. KETCHUM. We would be glad to welcome you.

Senator HOLLINGS. We appreciate your appearances here this morning.

Dr. KETCHUM. Thank you.

[The statement follows:]

STATEMENT OF DR. BOSTWICK H. KETCHUM, ASSOCIATE DIRECTOR, WOODS HOLE
OCEANOGRAPHIC INSTITUTION

Senator Hollings, Members of the Subcommittee on Oceans and Atmosphere, it is a pleasure to appear before you in order to make a statement concerning the pollution of the oceans, especially in the coastal area. I have been deeply concerned about oceanic pollution for at least 25 years, the major part of my professional career. I greatly appreciate this opportunity to make a statement for the record concerning the present state of our knowledge of ocean pollution. A brief curriculum vitae is appended to this statement for your information.

INTRODUCTION

It is unnecessary to elaborate before this Committee the value of the coastal zone and its marine resources for the benefit of mankind. As you well know, nearly half of the population of the United States lives within the regions adjacent to our coastal waters or the shores of the Great Lakes. Historically, the reason for this concentration of population in the coastal zone has been the ease of transportation of materials and people by marine shipping. Because of the density of people and of industry in this narrow strip of our land, the waters have long been used for the disposal of the waste products of our population and our technology. So long as population densities were low, the inshore ocean waters were able to recycle or recover from the added pollution. In many areas this is no longer true, and serious deterioration of water quality has resulted.

The oceans have also been a valuable source of food, particularly of the animal protein so essential in human nutrition, ever since our forefathers discovered and settled upon the shores. In many parts of our coastal zone indiscriminate waste disposal has depleted our fisheries resources in dramatic ways. Over 90%

of the total harvest of seafood taken by American fishermen comes from estuaries or the waters over the continental shelf. About two-thirds of that harvest consists of species whose existence depends upon the estuarine zone or which must pass through the estuary enroute to their spawning grounds. The salmon which used to abound in our Northeast rivers are excluded from practically all of them today, either because of the construction of dams or because of the pollution of the water itself. Many productive shellfish grounds have been closed because of pollution, and our inshore fisheries resources are less abundant, which is due, in part at least, to overfishing.

Today, there are increasing demands upon the coastal zone for many of man's activities. Navigation, disposal of pollutants, and fisheries resources remain important, but the recreational demands of our population are increasing dramatically. In the coastal waters these traditional users are in conflict with many of the amenities and more personal uses which our population rightfully feels should be maintained for future benefits.

By hindsight we can evaluate what man has done in the past, but we do not understand well enough the ways in which the marine ecosystem works to predict the results of new or proposed engineering developments. I think that it is clear that technology exists which would prevent or ameliorate the impact of marine pollution upon the environment, but we must apply this technology and be willing to pay the cost of correcting past errors and of preserving our marine environment for the benefit of future generations.

It is worth emphasizing that large parts of our coastal zone are still relatively unmodified by man's activities and that severe deterioration has been localized in areas of large population densities. It is imperative that the natural areas be preserved in their unmodified state even as we strive to improve the quality of areas which have been degraded. The Coastal Zone Workshop in Woods Hole last year discussed these problems at great length (The Water's Edge, Ketchum, 1972). The Coastal Zone Management Act of 1972 recognized the need for estuarine sanctuaries which should be preserved in a natural state to permit continuing research on the ecological relationships within the area. Additional recognition of the need has also been provided in the Marine Protection, Research and Sanctuaries Act of 1972. Such sanctuaries would preserve and protect the genetic stocks of plants and animals essential for the perpetuation of the marine ecosystem.

POLLUTANT CHARACTERISTICS

There are three characteristics of each pollutant which must be understood before one can evaluate the possible impact or hazard of its release to the environment. These are (a) the quantities produced which may reach the environment, (b) the toxicity of the pollutant to marine organisms and to man if it will reach him in his seafood, and (c) the persistence of the pollutant in the environment. Our knowledge is incomplete; sometimes with regard to all three of these essential characteristics of pollution. For example, production statistics are frequently considered to be proprietary information which industry will not make public. This makes it difficult or impossible to make a "materials balance" analysis of the flow of the substance through the environment, an analysis which is essential if we are to evaluate the relative impacts of different pollutants. It is obvious that a highly toxic pollutant which reaches the environment in very small quantities may be far less important than a less toxic material which is released in massive quantities.

General categories of materials may be cited as examples of the range to be expected among these characteristics. At one extreme are the heavy metals which are produced in large quantities, are toxic at low concentrations and do not degrade biologically or chemically, even though they may be trapped in the sediments and thus removed from the water column reducing their impact. Once added to the marine environment, however, they are there forever.

Various synthetic organic compounds, particularly the chlorinated hydrocarbons such as DDT and the polychlorinated biphenyls have also been produced in large quantities and are now found even in the water and organisms of the open ocean. These compounds are not produced naturally and organisms have

not evolved an ability to decompose or degrade them rapidly. We are still uncertain as to their persistence in the marine environment, but the available evidence suggests that they would be found for decades, perhaps centuries, even if all further additions to the environment could be stopped. Oil pollution is an increasing threat to the marine environment because of our ever-increasing demands for energy and the increased sea transport of oil in tankers. Mortality of marine organisms, sometimes extensive, has been found wherever accidental oil spills have been studied, and recovery from the high concentrations produced in these accidental spills may take months, years or decades depending upon the amount of oil spilled and how rapidly the oil is dispersed and diluted to non-toxic concentrations. Domestic pollution consists of the natural products of human metabolism and can be rapidly decomposed by natural marine processes. There are two critical problems connected with the disposal of domestic pollution to the marine environment, however.

First, in many of our estuaries the quantity which must be discharged exceeds the receiving capacity of the body of water to which it is added, and second, many sewage effluents contain toxic materials from industrial additions or from urban runoff. Proper treatment methods can remove most of these from the effluent, but they will remain in the sludge which also must be disposed of in some manner. The disposal of solid wastes of our civilization also poses increasing problems. Even though much of the solid waste is non-toxic, large quantities are involved. Some of this material is being disposed of in our coastal waters, such as the sewage sludge and dredging spoils disposal in the New York Bight and other areas. These substances have clearly caused deterioration of the environment where they are dumped. Each of these categories of pollutants will be discussed in greater detail below.

First, however, it may be desirable to comment in general upon the term toxicity, which is difficult to define and not always well understood. Any substance on earth is toxic if the concentration is great enough in the wrong environment. For example, a characteristic of the marine environment is the salt content of the water, but most marine organisms can survive only within a narrow range of salinity. Estuarine organisms, accustomed to brackish water, may not be able to survive in the open sea where the salinity is higher. Even pure water can be considered toxic since marine organisms cannot survive in fresh water and man cannot survive for long in pure water which is few inches above his nose. We are all accustomed to temperature fluctuations, but organisms cannot survive in an environment that is either too hot or too cold. The substances which are of the greatest concern, however, are those which are lethal in concentrations of parts per million (mg/l) or less. The toxic heavy metals, the chlorinated hydrocarbons and petroleum hydrocarbons are toxic at these low concentrations, and it is because of this that they are of greatest concern.

MARINE POLLUTANTS OF GREATEST CONCERN

Heavy metals

A list of eleven heavy metals which are toxic to marine organisms and which are reaching the environment in considerable quantities is presented in Table 1. All elements reach the marine environment in varying amounts as a result of the weathering of the continents and their transport by the rivers to the estuaries and ultimately to the sea. Many elements are also present in coal and petroleum and are released in varying amounts to the atmosphere as we burn these fossil fuels. Estimates of the rates of supply from these two sources are given in Table 1, which also lists the toxic concentrations in sea water. A relative critical index is computed by dividing the rate of supply by the toxic concentration. Actually, this index gives the volume of sea water (in cubic kilometers) which would receive an annual increment of the element equal to the listed toxic concentration. The concentration of the element already present in sea water is not taken into consideration because, in some cases, the concentration is so low that it would not modify the calculation, and in some cases the absolute concentration in the sea water is not accurately known.

TABLE 1.—TOXIC ELEMENTS OF CRITICAL IMPORTANCE IN MARINE POLLUTION BASED ON POTENTIAL SUPPLY AND TOXICITY, LISTED IN ORDER OF DECREASING TOXICITY

Element	Rate of mobilization (10 ⁹ g/yr) ¹			Toxicity ² D (mg/l)	Relative critical index (10 ¹² liters/yr.)	
	A(man) fossil fuels	B(natural) river flow	C total		A/D	C/D
Mercury.....	1.6	2.5	4.1	1×10 ⁻⁴	16,000	41,000
Cadmium.....	³ .350	?	³ 3.0	2×10 ⁻⁴	1,750	15,000
Silver.....	.07	11.0	11.1	1×10 ⁻³	70	11,100
Nickel.....	3.7	160.0	164.0	2×10 ⁻³	1,350	82,000
Selenium.....	.45	7.2	7.7	5×10 ⁻³	90	1,540
Lead.....	3.6	110.0	113.6	1×10 ⁻²	360	11,360
Copper.....	2.1	250.0	252.1	1×10 ⁻²	210	25,210
Chromium.....	1.5	200.0	201.5	1×10 ⁻²	150	20,150
Arsenic.....	.7	72.0	72.7	1×10 ⁻²	70	7,270
Zinc.....	7	720.0	727.0	2×10 ⁻²	330	36,350
Manganese.....	7.0	250.0	257.0	2×10 ⁻²	350	12,850

¹ After Bertine and Goldberg (1971) (except for fossil fuel production of cadmium).

² Water quality criteria: Concentration considered to pose minimal risk of deleterious effect. After Waldichuk (1972), NAS (in press).

³ Value from 3d annual report, Council on Environmental Quality, 1972. The total includes addition to soil and thus may be an overestimate.

To put this index into perspective, the area of ocean surface so modified can also be computed. The mixed layer of the ocean is of the order of 100 meters in depth and the area of ocean which could be contaminated to this depth by mercury, for example, as a result of the combustion of fossil fuel would be equivalent to 160,000 square kilometers or 61,500 square miles. This area is almost equal to the land area of the state of Washington represented by the Chairman of the Committee on Commerce, Senator Magnuson. It is almost twice the area of South Carolina represented by Senator Hollings, Chairman of the Subcommittee on Oceans and Atmosphere. It is clear that we are not talking about an insignificant problem for mercury, which presents the most serious hazard, or even for some of the other elements which would affect smaller volumes of water or areas of the sea. Another perspective is given by computing the time it would take to add this concentration of material to all of the water in the ocean. Using mercury again as an example, it would take 10,000 years to contaminate all of the oceanic waters to the indicated level of toxicity. This is not a very meaningful calculation, however, because the oceans are not uniformly mixed and the concentration at the locality where the pollutant is introduced will inevitably increase more rapidly than the average for the whole ocean.

Chlorinated hydrocarbons

A wide variety of synthetic organic chemicals are also reaching the environment, particularly the chlorinated hydrocarbons such as DDT (and its decomposition products) and polychlorinated biphenyls (PCB's). These are not readily biodegradable, and the ocean is the ultimate sink for such compounds. Woodwell, et al. (1971) have modelled the circulation of DDT in the biosphere and they conclude that the largest reservoir for DDT is in the atmosphere, but also that the amount not decomposed by ultraviolet rays in the troposphere will ultimately be added to the surface of the sea. If production of DDT stops in 1974 the model predicts maximum concentrations in the mixed layer of the sea (upper 100 meters) in 1971 after which it would decrease to 10 percent of the maximum by 1993. If production were to increase, however, the concentrations in both the sea and the atmosphere would also increase.

Harvey, et al. (1972) found substantial concentrations of DDT and its breakdown product, DDE (up to 100 µg/kg wet wt. in a shark) and even higher levels of PCB's (up to 1056 µg/kg wet weight in a dolphin) in a variety of organisms collected from the open sea many miles from land confirming the probability of atmospheric transport. As expected, these compounds are concentrated in

the lipid pool of the organism with maximum concentrations of 3300 for DDT and DDE and of 21,100 $\mu\text{g/kg}$ lipid for PCB's. None of the concentrations observed by Harvey, et al. (1972) were as great as those assumed by Woodwell, et al. (1971) for oceanic fish or plankton to estimate the accumulation in the biota (assuming dry weight to be 25% of wet weight). The lower accumulations in marine organisms could be caused by a shorter atmospheric half life of DDT, by faster degradation in the marine environment or by greater accumulation in sediments than the estimates used by Woodwell, et al. (1971) in their computations.

A variety of synthetic organic chemicals, including other pesticides, detergents and pharmaceuticals are also undoubtedly reaching the marine environment with impacts which are virtually unknown. The detrimental effect of DDT on bird breeding potential is well documented and some experiments have been done on a few forms of marine life, but the information is still inadequate for a complete evaluation of the impact on the marine biota of DDT and even less adequate for the other synthetic organic compounds (SCEP Task Force, 1971; NAS, 1971; NAS, in press).

Oil pollution

Petroleum, including crude oil, refined products and petrochemicals are now polluting the sea in large amounts. Revelle, et al. (1971) estimated the total direct oil pollution of the oceans to be 2.2 million tons annually. The sources were accidental spills, tanker operations, other ship operations, offshore production, refinery operations and industrial and automotive wastes. Oil slicks and tar balls have been observed on the high seas, and the abundance of tar balls is now greater than the normal sargassum weed in the open Atlantic (Horn, et al., 1970; Morris, 1971). Although accidental oil spills, such as the grounding of the *Torrey Canyon* or the Santa Barbara oil well blowout, are spectacular events and attract the most public attention, they actually contribute less than 15% of the total amount of oil entering the marine environment annually.

Numerous studies of toxicity and effects of oil pollution have been made, but more careful studies of selected fractions of this complex mixture of hydrocarbons are needed. It is apparent that these hydrocarbons are degraded in sea water, but little is known about the rate of turnover of this material in the marine environment. Extended studies of the spills of refined fuel oils from the *Tampico Maru* in Baja, California, and from the *Florida* in West Falmouth, Massachusetts, have shown that it has taken several years for partial recovery of the biota and the data suggest that it may take a decade or more for complete re-establishment of the natural community (NAS, 1973). The initial impact of crude oil spills, such as that from the *Torrey Canyon*, seem to be less severe and the recovery more rapid. These spills generally occur in more open waters and the oil is thus more widely dispersed (NAS, loc. cit.). There is apparently little measureable direct effect of chronic, low-level (sublethal) contamination, such as has occurred off the coast of Louisiana for several decades.

Our technology is based upon an expanding energy use which will require additional petroleum supplies including those from submarine reservoirs and increasing amounts transported in tankers from distant oil fields. If the rate of loss in our utilization and transportation of oil cannot be radically decreased by application of adequate controls wherever possible, the amount of petroleum hydrocarbons entering the sea will increase. Revelle, et al. (1971) estimated that the increase would be in direct proportion to the total world production of oil without adequate controls.

Because of the increase in oil tanker traffic and of ships burning fuel oil and the resultant pollution of the high seas by oil, this has become an international problem. The Intergovernmental Maritime Consultative Organization (IMCO), a specialized agency of the United Nations, convened an international conference in London in 1954 which drew up the International Convention for the Prevention of Pollution of the Sea by Oil. This came into force in July 1958 and was subsequently amended by an IMCO-convened conference in 1962. Further resolutions provide for the prohibition of deliberate oil discharge from ships at sea and for the establishment of an international compensation fund for oil pollution damage (IMCO, 1967). An additional conference is scheduled for the fall of 1973 to consider further regulations controlling oil pollution.

Domestic pollution

Human wastes are also added to the marine environment and can cause difficulties when added in excessive amounts. Sewage treatment plants have been designed primarily to reduce the organic material in the effluent which, when it decomposes in the environment, cause oxygen depletion. Complete removal of

the dissolved oxygen in the water makes it impossible for most marine organisms to survive and also results in the production of hydrogen sulphide, a toxic, malodorous gas. Even when the treatment methods are successful in preventing excessive oxygen depletion, the fertilizing elements remain in the effluent and can stimulate excessive growth of objectionable plant populations in the process known as eutrophication. This plant growth can produce as much organic material as was removed at considerable cost in the treatment plant, thus partly defeating the purposes of sewage treatment.

Because of the biodegradability of domestic pollution, it is not persistent in the environment, except for the added fertilizing elements. For the oceans as a whole, therefore, domestic pollution is not a significant problem, but it is important in more confined areas where the density of the human population is high and the recovery capacity of the system is limited. I have computed, for example, that the population of metropolitan New York discharges into the Hudson estuary about 5 to 10 times as much domestic pollution as the system can recycle without an adverse impact (Ketchum, 1969). Fortunately, the mixing in the Hudson estuary is vigorous and by the time the water leaves the Harbor and enters the New York Bight the dilution is sufficient to reduce the concentrations of nutrients to acceptable levels.

A corollary of the fertilizing effects of domestic pollution is the fact that it could be used beneficially to stimulate the productivity of the sea if it were discharged within the limits of the receiving capacity of the ecosystem. This must be carefully done to avoid unfortunate side effects but it is possible, theoretically at least, to use this type of pollution for beneficial purposes rather than to dispose of it in ways that cause deleterious effects.

Solid Wastes

Solid waste disposal has become one of the most urgent and difficult problems in crowded urban centers. The types and amounts of waste materials dumped at sea in the coastal waters of the United States in 1968 is presented in Table 2 (Council on Environmental Quality, 1970). Nearly 50 million tons of waste material was dumped in United States' coastal waters, most of which was dredging spoils resulting from channel and harbor development. The Council estimated that 34% of these dredging spoils could be considered polluted. Pearce (1970) has presented data to show that both the polluted dredging spoils and the sewage sludge from waste treatment plants which has been dumped in the New York Bight have caused damage to the bottom dwelling population in the area. The Marine Protection, Research and Sanctuaries Act of 1972 regulates the transportation and dumping of materials into the oceans, coastal zones and other waters. A permit system is established to be administered by the Army Corps of Engineers for dredging and filling and by the Environmental Protection Agency for all other purposes.

TABLE 2.—OCEAN DUMPING: TYPES AND AMOUNTS, 1968

[In tons]

Waste type	Atlantic	Gulf	Pacific	Total	Percent of total ¹
Dredge spoils.....	15,808,000	15,300,000	7,320,000	38,428,000	80
Industrial wastes.....	3,013,200	696,000	981,300	4,690,500	10
Sewage sludge.....	4,477,000	0	0	4,477,000	9
Construction and demolition debris.....	574,000	0	0	574,000	-----
Solid waste.....	0	0	26,000	26,000	1
Explosives.....	15,200	0	0	15,200	-----
Total.....	28,887,400	15,966,000	8,327,300	48,210,700	100

¹ From CEQ, 1970.

Ocean dumping is also a subject of international concern. An intergovernmental conference convened by the United Nations was held in London, 30 October to 10 November, 1972. A Convention on the Dumping of Wastes at Sea was adopted and will be open for signature from 29 December, 1972, until 1 December, 1973. It will come into force when it has been ratified by 15 nations. The Convention prohibits the dumping of some materials; requires a special permit for the dumping of other identified substances; and a general permit for all other substances.

CONCEPTUAL FRAMEWORK FOR WATER QUALITY EVALUATION

In an effort to summarize in one figure the various aspects of marine pollution which I have been discussing, I submit a diagram in Figure 1 showing the various processes which must be understood in order to evaluate the marine ecosystem and its capacity to accept and recycle various types of pollutants. If the diagram appears to be complicated, it is because we are discussing a complex problem.

CONCEPTUAL FRAMEWORK FOR WATER QUALITY EVALUATION

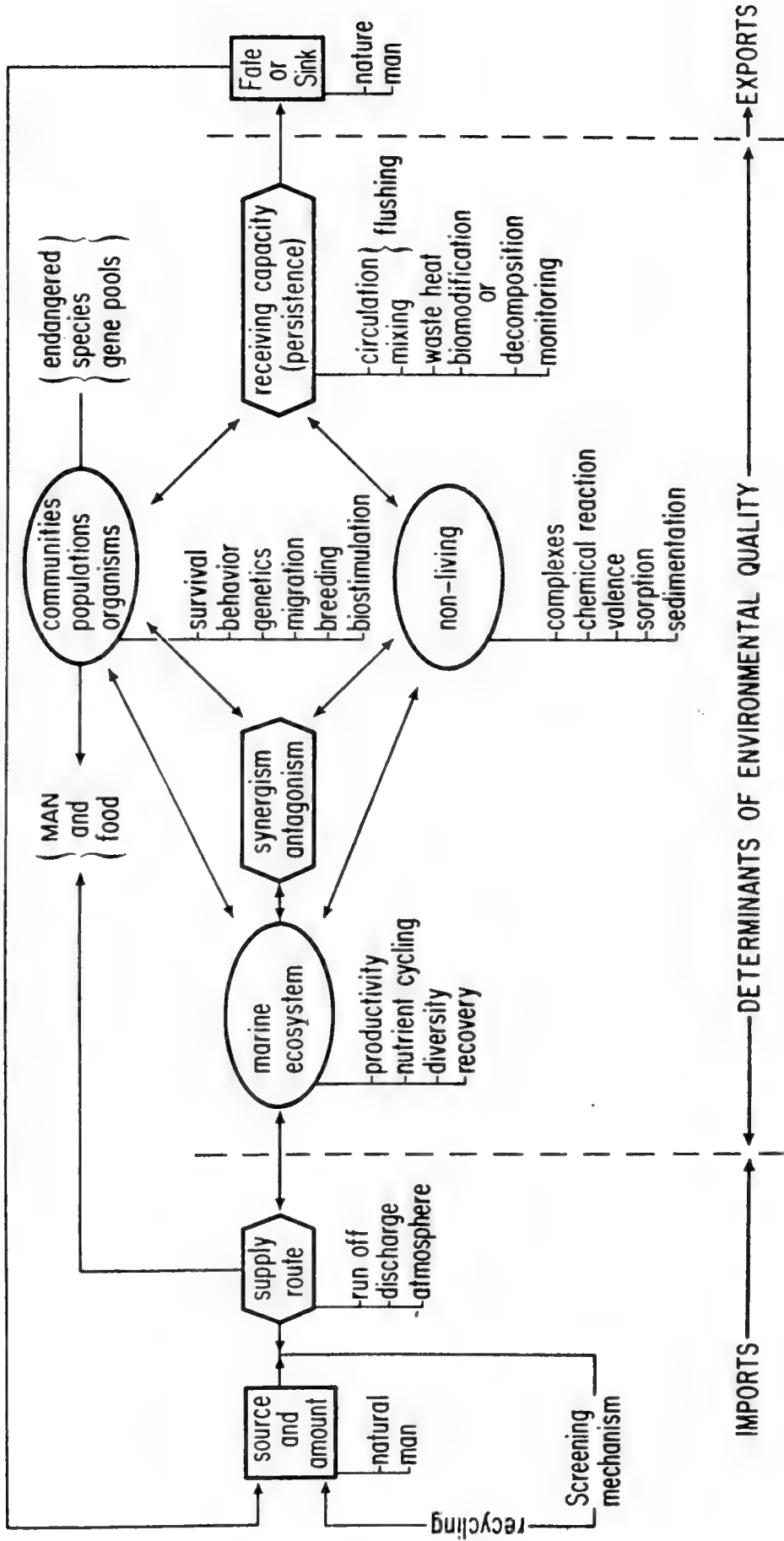


FIGURE 1

Many, but not all, of the entries in this diagram have been discussed above. One must know the source and the amount of the specified pollutant and the routes by which this material reaches the sea, whether by runoff, discharge or by atmospheric transport. It would be desirable to have a screening mechanism established to evaluate the possible impact of new chemicals, hundreds of which are being produced annually. Where the hazard is great, these chemicals should be recycled and not permitted to enter the environment. Once the pollutant does enter the environment, its impact on the marine ecosystem and on the communities, populations and organisms which live in the ocean need to be evaluated. It is important to appreciate the fact that the impact need not be direct and immediate by causing the death of organisms but can have more subtle, sublethal effects which influence the survival or behavior of the organisms. The various chemical and geological processes which need to be considered in terms of each pollutant are listed under the "non-living" category and it is, furthermore, important to know whether two or more pollutants introduced simultaneously will augment each other's impact (synergism) or will interfere with each other's impact (antagonism). Only when the complex nature of the marine ecosystem, and the various processes taking place there, are understood can one evaluate the possible receiving capacity of a given system for a given pollutant.

Naturally, it is of concern to evaluate whether or not the pollutant can return to man in the seafood that he needs for his nutrition. Also, the impact on endangered species can be of special concern. An example of this type of impact is the mortality of many birds which result from oil spills. Dead, oiled birds on the beaches constitute the most immediate and obvious effect of oil spills, and this mortality can have a serious impact at certain times of year if a major part of a population of a given species is present in the area either for breeding or during their migratory passage.

In conclusion, I would like to emphasize that the only ultimate solution to the problems of pollution is to recycle the materials that we produce and use in our civilization. Discharging these materials to the environment is both wasteful of resources and causes undesirable impacts upon the marine ecosystem. Complete recycling is probably an unattainable goal, but certainly every effort should be made to recycle materials as completely as possible, not only to conserve our natural resources, but also to prevent the further deterioration of our environment, which we must preserve for the ultimate benefit of man.

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Senator HOLLINGS. Next we have Dr. Karl K. Turekian of Yale University. I think you are the professor of geology and geophysics at Yale, and we are very pleased to have you with us here this morning.

STATEMENT OF DR. KARL TUREKIAN, PROFESSOR OF GEOLOGY AND GEOPHYSICS, YALE UNIVERSITY

Dr. TUREKIAN. I have, Mr. Chairman, a book that has just come off the press that my colleague Dr. B. J. Skinner and I have written called "Man and the Ocean." I would like to give it to you. It deals with the different problems of man and the ocean.

Senator HOLLINGS. We appreciate it very much.

Dr. TUREKIAN. I will keep away from detailed technical discussions involving our scientific work in the coastal areas and get right to what I have given to you as a written statement.

Man's mandate to exploit the land is taken as axiomatic since we can hardly argue against farms, cities or esthetically cultivated areas called parks. But farms represent the replacement of a wild diverse flora with single-species crops like wheat or cotton, and cities represent the replacement of a wild diverse fauna with a single species, man. All of these acts in some way perturb the environment. On land we can try to make man's interventions esthetically and hygienically acceptable but we can never go back to the primeval natural system short of complete abandonment of the terrain. Our attempts, successful or not, are based on management principles based on millenia of experience.

Because of the vastness of the sea and, until very recent times, the relatively small impact of the time honored oceanic activities of transportation, fishing, warfare, and piracy the concept of the management and use allocation of oceanic regions appeared inapplicable. But of course things have changed now, especially in coastal regions, and criteria for the proper management of oceanic resources are being sought.

A major difference between oceans and land is that the dynamic, three-dimensional nature of the perturbable ocean system can result in consequences remote from the point of perturbation. In addition, the ocean system varies in its properties depending on depth, geography, wind, proximity to land, and continental runoff. The natural qualities of the highly diverse ocean system must be understood if we are to

understand what the effects of any specific human activity will be on that system. We must also understand in what manner and to what degree our specialized use of one part of that system will affect other parts of the system.

In light of our general ignorance about these matters, research on the natural oceanic system must accompany any attempts at regulating the use of the oceans by man. We should also, wherever possible, use the tracers available from man's planned or inadvertent actions to help us understand the behavior of the natural system. A national program in what I shall call "unfettered" research on the marine system initiated by scientists and subject to the purifying type of debate typical of such research will do more to establish guidelines as to what the tradeoffs must be in man's ineluctable drive to the sea than any highly directed crash program.

UNFETTERED RESEARCH

I would like to give you a few examples of how unfettered research, initiated and promoted by scientists, has helped us understand the impact of man on the oceans. My expertise is in the field of the marine geochemistry of the heavy metals and I will confine my examples to this area.

The interest in the behavior of heavy metals where streams meet the ocean has been with us long before the interest in heavy metal pollution. The reason is that the natural rate of supply of metals to the oceans and the high solubility of most of the heavy metals in open aerated seawater, because of complex formation, predict much higher concentrations of heavy metals in the ocean than is found. The classic case of this is the realization by Haber, the great German chemist, that he could not economically extract gold from the sea to help Germany pay reparations after World War I. Investigators have thus concluded that there must be a self-purifying process active in the ocean system to remove these metals and one natural candidate, from a chemical point of view, is the estuarine environment. This is an area of high biological productivity and rapid sedimentation so that the sediments can be depleted in oxygen before all the organic matter is utilized by aerobic organisms. Anerobic organisms then utilize the organic material with the conversion of trapped seawater sulfate to hydrogen sulfide—the chemical with the rotten egg smell—which then controls the chemistry. Under these conditions most heavy metals form insoluble compounds of sulfur—as sulfide—and are immobilized. Iron and manganese, unlike these other metals, form fairly soluble sulfide compounds and are subject to release. As they reach aerated water they form highly insoluble oxide compounds which act as scavengers for heavy metals in the water columns. There is the possibility that this process is the major source of the ferromanganese oxide nodules found in the deep sea which are being actively considered for metal exploitation.

Most aspects of this, and related work, have been carried on by scientists long before the current concern for pollution, supported in many cases by funds dedicated to unfettered research. I believe that in adequate understanding of the consequences of heavy metal pollution in coastal systems will come primarily from a continuation of this type of research which should be encouraged philosophically and financially.

My second example comes from the concern over the aerosol transport of lead from automobile exhaust to the oceans. Dr. Clair Patterson of the California Institute of Technology, a geochemist who has contributed significantly to both the primary marine lead data and the human interest aspects of the lead problem, was probably driven to concern over lead pollution when he had to worry about how one gets a lead-free laboratory in smoggy Pasadena in order to determine the age of the solar system. His geochemical expertise not only established the age of the solar system at 4.55 billion years but was harnessed to understanding the effects of lead transport to the oceans.

In a manner analogous to the transport of man-injected aerosol lead, a natural radioactive lead isotope Pb^{210} is also transported from continents toward the ocean through the atmosphere. As it is removed from the air into the surface water and then subsequently into the sediments, it can be used to study both the rate of deposition of coastal marine deposits and also in determining the fate of lead in the oceans. Thus, the study of the marine disposition of Pb^{210} can be used as an index of the behavior of heavy metals in general.

Again, these results are the direct consequence of unfettered research programs following the logical paths shown by antecedent results. One cannot imagine that a directed program for estuarine pollution studies would have had the marine geochemical behavior of Pb^{210} as the highest priority item. Indeed, it is doubtful if it would be understood, in the earlier days of its use, by anyone except those interested in natural and manmade radioactivities.

My third example is the recent observation by several investigators in the United States and France that suspended particulates in the deep ocean water columns are enriched in heavy metals far above the concentrations in deep-sea sediments underlying them. The most direct interpretation of this result is that fine-grained indigenously produced particles are scavenging these metals from the water column. This helps to explain why, despite the increased supply of mercury to the ocean surface by man's activities as well as other metals, virtually no change in concentration is seen in the water column.

Again, this research was part of more general work on the fate of particulates throughout the ocean system. Such work has been of concern to international scientists long before the drive to regulate or understand heavy metal pollutants.

On the basis of these and many other examples, I contend that good fundamental research tested in the open scientific marketplace against peers will do more to provide the framework to make decisions about competing uses of the sea than highly directed research aimed at arriving at immediate answers to these problems.

THE ORGANIZATIONAL PROBLEMS

I am a university professor and am committed both to the unfettered research concept and to involvement with the contemporary problems affecting the marine environment. The overwhelming impression that I get from Federal agencies is that there is a feeling in Washington that one should be able to finance the quest for an answer to the complex problem of multiple use of a large complex system like the ocean in the same way that one finances research for a fighter plane. To me, there is very little comparison between the two methods of financing or

management. It would be like comparing the management of the production of the first A-bomb with managing the production of the equation $E=Mc^2$. They are qualitatively different ways of looking at things.

Based on my experience over the years, I think that in order to obtain the best background, to make the best operational decisions about problems involving the choices among the proposed multiple uses of the oceans, unfettered research in the general area must be supported by the Federal Government. I find, however, that there are organizational hindrances to the accomplishment of such a plan.

1. Within the special programs of the NSF such as RANN and IDOE, I sense that there is uncertainty as to who should underwrite support of coastal marine research. If it is RANN's domain I have a clear indication that they are unwilling or incapable of making decisions regarding the level of involvement in supporting research aimed at solving problems through the unfettered research approach. IDOE appears to be shackled in supporting coastal research because of the preemptory role assigned to RANN in this region.

2. Although there is good reason to support various agencies in implementing research in the coastal zone, I would like to understand how nongovernmental researchers are involved or can be involved in the major NOAA, Corps of Engineers, and EPA marine projects whose work is done part in-house and part out-house. The mechanism of the RFP—Request for Proposal—violates the very principle of unfettered research by productive scientists and should not be the instrument of involvement of researchers in universities and research institutes.

3. To an outsider there is the recurring image that both the Corps of Engineers and the EPA wants to see "work done" in coastal waters in order to proceed with either their activities or their endorsement of activities but it is not always clear what the "work" to be done is. If it is "activity" in a general sense, certainly the important thing is to support unfettered research in the general area. However, it appears that both organizations, although occasionally supporting such investigations almost by accident, are not heavily committed to the concept.

In summary the highly productive university and nonprofit institutional laboratories who have been successful in advancing the understanding of the coastal zone are in jeopardy of being excluded from the concern over the multiple use of the oceans problem by the downplaying of the unfettered research concept. Universities, by nature, are most productive in the generation of concepts and the training of successive generations of scientists when they are least hobbled directly or indirectly.

Senator HOLLINGS. What would you do about it?

Dr. TUREKIAN. I would get the Federal organizations for one thing to cut out the confusing intramural discussions about who should support what problem area as a device to establish power in one area of marine environmental policy or another.

EPA, versus the Corps of Engineers, versus NOAA, versus the Coast Guard versus the State agencies. This is the sort of thing that comes to an outsider. I see all these guys, sympathetic to the work that is being done, but scared they won't be identified as having the priorities in an area so their support of research becomes one with

strong public relations overtones appearing to be immediately pragmatic. RANN may not be curtailed by its own mandates or resources, or whatever it is, but it almost always reacts as to whether it will upset or be upset by EPA or the Corps of Engineers or some other management group.

Senator HOLLINGS. What about research within the Department of the Interior? Do you think, as an independent observer, Interior is capable of carrying on the research necessary for the coastal zone development?

Dr. TUREKIAN. Interior is just one Department that does work in-house. I don't mean to attack the work being done in-house by organizations capable of doing this, like NOAA and Interior or whoever else does this. These are competent outfits and they do competent work in these areas, but both of those organizations, as well as the others who don't have strong in-house capabilities, talk about out-house work.

They talk about involving universities, and other research organizations, but it is complex trying to get money from these agencies to do work universities are most capable of doing. Universities don't primarily go out and measure the level of a pollutant. That is not their job. Their job really is essentially to brainstorm and think about the problem and get people out there working who are aggressive, active young people who are going to be the future managers and scientists in these organizations.

Senator HOLLINGS. How would you coordinate in a better fashion, Doctor? What would you do among them all? Are you suggesting there should be better coordination?

Dr. TUREKIAN. I am not sure coordination is the important thing. I think if there is competition, which I approve of, that it should not be detrimental to the support of pure research.

Everybody should not try so hard to be involved with the decision-making process as to what should be done in a coastal area that they are afraid of supporting apparently nonfocused research.

For example, we have been doing work in Long Island Sound for a long time, long before it was a popular thing, and a lot of the decisions about the properties of coastal waters came to us from those preliminary studies. Dr. Bostwick Ketchum did the same thing elsewhere 20 years ago. Now, there is a danger that agencies are not accessible to requests for further funding for such types of research.

I don't mean that one can't get money. Don't misunderstand that, but the funding agencies seem always to want the proposal to be phrased to answer questions like: "Can you find a plutonium problem outside a reactor?" or some other highly focused question. I want to study what will happen if you dump plutonium in the oceans generally. This is a more substantive approach to the solution to problems on the long run.

Senator HOLLINGS. Unfettered research.

Dr. TUREKIAN. In a general area of the problem. I don't mean you take out big piles of money and give it to people and say, "Go off, and whatever you come up with, you come up with."

I would like to worry about the coastal zone, and that is to brainstorm it, and not give you a bunch of numbers which you can put into some sort of an environmental quality report.

Senator HOLLINGS. All right, sir. I wish we had a little more time this morning. I do appreciate your presentation. It is helpful to the committee.

The next witness is Dr. Herbert Volchok, of the Environmental Studies Division of the Atomic Energy Commission, and Dr. Ted Folsom, Research Oceanographer of the Ocean Research Division of Scripps.

STATEMENTS OF DR. HERBERT VOLCHOK, CHEMIST, ENVIRONMENTAL STUDIES DIVISION, ATOMIC ENERGY COMMISSION, NEW YORK; AND DR. TED FOLSOM, OCEANOGRAPHER, MOUNT SOLEDAD LABORATORY, SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA, LA JOLLA, CALIF.

Dr. VOLCHOK. Mr. Chairman, I have submitted a prepared statement which I will read.

The oceans have been radioactively polluted by man and without doubt, our continued activities will add to this burden of contamination. As used here, and in general current usage, pollution refers to the presence of harmful or potentially harmful substances in any of the Earth's environmental compartments, due to the activities of man.

The words contains no implication of degree, hence pollution runs the full gamut, from trace quantities of lead in the glaciers of Greenland, to near hazardous concentrations of carbon monoxide on the freeways of some of our big cities. Hence, we really must take care, especially in communication with the lay public, to indicate the level of contamination in the environment and if possible, to relate this level to either known effects or accepted standards.

Senator HOLLINGS. Dr. Volchok, would you make specific tests of an area, or port facility which has been approved for the acceptance, like the Port of Charleston, where we bring waste materials up the Savannah River?

You remember the time we had that drop there, and we took about 600 tons? To bring that in, would be constantly checking that particular area of the ocean?

Dr. VOLCHOK. I sure would.

Senator HOLLINGS. For radioactivity?

Dr. VOLCHOK. I would.

Senator HOLLINGS. What have you found, if anything?

Dr. VOLCHOK. I am not competent to answer specifically, but in that particular case, which was plutonium I hope it is being checked.

Dr. FOLSOM. In that connection, there was some preparation made for that sort of an accident in the form of looking at what would have happened if plutonium landed along the coast. Some 10 years ago, around 1964, we studied the buildup of plutonium on the coast, and if it had fallen on the coast of Spain, we would have known what to do about it.

Senator HOLLINGS. Thank you. Go right ahead.

Dr. VOLCHOK. In the following pages, I will synopsise radioactive pollution of the world ocean. I feel compelled, however, to make a few comments in advance, which may be construed as excuses for our fairly incomplete knowledge of this important subject.

Primarily, the difficulty has been ignorance. Until the real value of the oceans was broadly recognized as a world resource, relatively little effort was put forth in either monitoring or research.

For example, consider the case of strontium-90 (Sr^{90}), a product of nuclear testing, which has been distributed all over the world in fallout. Since the beginning of the fallout study programs, approximately 1 analysis for Sr^{90} pollution on land was carried out for every 2,000 square miles, an area about 45 miles by 35 miles.

In the sea, by comparison, we only did about 1 per 15,000 square miles, about 120 miles by 120 miles. Even further, in the sea we have the added dimension of depth. Accounting for the entire volume of the world ocean, we find that on the average, one strontium-90 analysis has been made for every 3 times 10^{16} gallons of water; or to put it another way, approximately 1 sample for a body of water the size of Hudson Bay, and less than 10 for the entire Gulf of Mexico.

It should be mentioned that studies of oceanic pollution have also been inhibited by the difficulties and therefore, high costs inherent in working at sea. Obtaining samples of seawater and sediment, particularly from great depths is a complex business and these are among the most troublesome materials to analyze chemically.

In retrospect, it does not seem too surprising, therefore, that studies of radioactive ocean pollution have lagged. At this time, however, there does seem to be some indication of increasing activity in this field, mainly related to the environmental impact of nuclear power generation.

The major portion of the testimony to follow was culled from five published documents:

1. Environmental Effects of Producing Electric Power Hearings before the Joint Committee on Atomic Energy, 91st Congress—1970.
2. Radioactivity in the Marine Environment; National Academy of Sciences—1971.
3. Impingement of Man on the Oceans, edited by Donald W. Hood; Wiley-Interscience—1971.
4. A Guide to Marine Pollution, compiled by Edward G. Goldberg; Gordon and Breach—1972.
5. Ionizing Radiation: Levels and Effects, Volume I; United Nations Scientific Committee on the Effects of Atomic Radiation—1972.

The two significant sources of radioactive pollution of the oceans are: (1) nuclear explosives; and (2) nuclear reactors, fuel reprocessing and waste management.

There are a number of other sources such as leaks, and waste from medical research, and industrial radioisotope applications, and radioisotopic power sources. The total contribution of these to the oceans is negligible at this time.

With respect to nuclear explosives: More than several hundred radioactive isotopes are produced in an atomic explosion, both by the process of nuclear fission, and by activation of the environment by neutrons from the bomb.

For the most part, however, the produced species have relatively short half-lives—radioactive elements disappear by decaying to a stable form at a constant rate, called half life. Hence, considering long term, global scale pollution effects, most of them can be neglected.

The ones of most concern are those with half lives measured in years and having properties which may tend to concentrate them in marine biota, or which otherwise may move through the food chain to become a threat to man. These, emanating from nuclear explosives are shown in table 1.

TABLE 1.—RADIOACTIVE POLLUTANTS IN THE OCEANS FROM NUCLEAR EXPLOSIONS

Pollutant	Symbol	Half Life (years)
Iron-55.....	Fe ⁵⁵	2.9
Tritium.....	H ³	12.0
Strontium-90.....	Sr ⁹⁰	28.0
Cesium-137.....	Cs ¹³⁷	30.0
Carbon-14.....	C ¹⁴	5,500.0
Plutonium-239.....	Pu ²³⁹	24,400.0

The main pathway which brought these pollutants to the sea is fallout. The debris created in the nuclear detonation rises in the air and then disperses, carried great distances by the winds. Since most of the nuclear products were formed in larger explosions, they were carried into the stratosphere. The fine particles resided in the stratosphere for an average period of about 1.5 years, during which they were distributed all around the world, and gradually settled to the Earth's surface, carried down mainly by precipitation.

Since about 70 percent of the world surface is ocean, it is clear that 70 percent of all of the fallout was initially deposited in the seas. Additional amounts of the nuclear bomb products are subsequently carried to the oceans by the rivers and streams, but this is a small fraction of the total.

Table 2 summarizes the information available on concentrations of the fallout pollutants in seawater and sediment; table 3 lists the data for several biological groups.

TABLE 2.—CONCENTRATIONS OF SOME FALLOUT POLLUTANTS IN SEAWATER AND SEDIMENT¹

	Water		Sediment
Fe ⁵⁵	0.1	-1.0	-----
H ³	1.0	-100.0	-----
Sr ⁹⁰.....	.1	-1.0	1.0-100
Cs ¹³⁷.....	.1	-1.0	1.0-100
C ¹⁴.....	.01	-.1	-----
Pu ²³⁹.....	.00001-	.001	.1-1

¹ The units are picocuries (a millionth of a millonth of a curie) per liter of seawater, and picocuries per kilogram of sediment. Picocurie is abbreviated pCi.

TABLE 3.—CONCENTRATIONS OF SOME FALLOUT POLLUTANTS IN MARINE LIFE¹

	Seaweeds	Mollusks	Crustaceans	Fish
Sr ⁹⁰	1.0-10	0.01-10.0	1-10	1-10
Cs ¹³⁷	1.0-10	1-10.0	1-10	1-100
Pu ²³⁹.....	.1-10	0.01-.1	-----	0.001-0.01

¹ The units are pCi per kilogram of wet biological material.

The total content of radioactive pollution contributed by nuclear weapons tests in the world ocean at this time is about 10⁹—1,000 million—curies.

Assuming that the rate of atmospheric testing is not appreciably greater than it was over the past 5 years, this value will remain the same or even decrease. It should be noted here, only to place this total pollution content in perspective, that the natural radioactivity in the oceans, principally potassium-40 is about 1,000 times greater than that which fell in from the weapons tests.

Nuclear fission reactors have numerous applications, such as: Electric power, desalination, vehicle propulsion, research, and production of special materials. The major growth, worldwide, will almost certainly be in the power production category.

The reactor process is essentially a controlled nuclear chain reaction, hence all of the same potential pollutants are produced: fission products from the splitting of the fuel atoms and neutron activation products from reactions with materials in the environs of the core, where the chain reaction takes place.

By design, the fission products are meant to remain in the core of the reactor, within the encapsulated fuel elements. There have, however, been cases of leaks, as well as accidents allowing releases to the environment.

Because of the requirement for extensive cooling of the reactor core, they are for the most part built near rivers. Water from the river is pumped through the reactor, and returned to the river.

Most often, it is in this operation, that the activation products are formed from impurities in the coolant water, and these are commonly found entering the sea.

The potential for environmental pollution is much greater in the reprocessing of the nuclear fuels. Here, the spent fuels are purified of the fission products in order to reclaim and reuse the fuel. The highly radioactive, long-lived fission products recovered in this process plus certain components of the fuel constitute the nuclear waste which must be managed to prevent the possibility of leaks to the environment.

This management must be maintained literally for hundreds and perhaps thousands of years. Hence, the high-level wastes, too, constitute a pollution threat. Low-level wastes from reprocessing plants have been, and to some degree, continue to be disposed of in the oceans.

Table 4 lists the approximate concentrations of the long lived radioactive pollutants in seawater and sediments, near shore, in the neighborhood of operating reactors, resulting from controlled disposal of wastes.

TABLE 4.—CONCENTRATIONS OF SOME WASTE POLLUTANTS IN SEAWATER AND SEDIMENT¹

	Seawater	Sediments
H ³ -----	10 -100	-----
Fe ⁵⁵ -----	0.01- 10	-----
Sr ⁹⁰ -----	1 -100	-----
Cs ¹³⁷ -----	1 -100	100- 10,000
Pu ²³⁹ -----	-----	100-100,000

¹ The units are pCi per liter for the seawater and pCi per kilogram for the sediments.

Table 5 shows the range of concentrations which have been observed in marine organisms, attributable to controlled waste disposal at sea. These data also were obtained near shore.

TABLE 5.—CONCENTRATIONS OF SOME WASTE POLLUTANTS IN MARINE ORGANISMS¹

	Seaweed	Molluscs	Crustacean	Fish
Fe ⁵⁵ -----	100	100-1,000	-----	-----
Sr ⁹⁰ -----	10- 100	100-1,000	1,000	1
Cs ¹³⁷ -----	1,000	100-1,000	-----	1,000-10,000
Pu ²³⁹ -----	100-10,000	-----	-----	1-10

¹ The units are pCi per kilogram of wet biological material.

The total of these materials estimated to be presently in the oceans is 1 million curies, about 1,000 times less than the amount estimated earlier as due to fallout from weapons testing.

This will undoubtedly increase with the growth of the nuclear power industry. One estimate indicates that in the year 2000, the radioactivity in the sea attributable to the nuclear industry will about equal that from fallout.

On balance, it appears that the current pollution of the oceans by long-lived radioactive species is relatively small compared to the natural levels. This should not be taken as a reflection of the biological significance of the specific pollutants as they have widely ranging toxicities. The degree of hazard must be evaluated taking into account the probability of human exposure to each of the individual isotopes.

Based upon predictions of the growth rate of nuclear reactors for the production of power, the oceanic inventory of long-lived pollutants from reactor-related operations, might be expected to increase by 100 to 1,000 times its present level. However, with already experienced and anticipated technological advances in waste management, there is reasonable expectancy that the inventory will not increase very much.

The major unknown in the rapidly expanding nuclear energy field, which could strongly affect the oceans, is the question of accidents; accidents at the power station, in transport of fuel or wastes, at the re-processing plants, or at the waste cemeteries.

This is even more forcefully emphasized when we consider the probability of locating nuclear powerplants offshore, in or on the ocean. Obviously, we have no answers to this. But it is also obvious that to protect man, the environment must be protected; the greatest possible vigilance must be exercised in these next few decades of the atom.

Thank you, sir.

Senator HOLLINGS. Doctor, my memory might be a little hazy, but I am trying to clarify the statement, perhaps made earlier to this committee, that it would be OK to locate nuclear powerplants offshore, and Dr. Ramey testified that it presented no threat, and you differed with that statement?

Dr. VOLCHOK. No. I do not.

I just make the point that we must worry about pollution on the ocean as well as on land; and be very careful about accidents.

Accidents in nuclear powerplants can be serious; leaks can be very serious.

Senator HOLLINGS. How many have we had in the last 5 years?

Dr. VOLCHOK. I do not believe we have had any of significance.

Senator HOLLINGS. Dr. Folsom.

Dr. FOLSOM. I work mostly in the open ocean but I would like to make a point on coastal areas.

I have submitted for the record a small paper read to oceanographers and geophysicists last week in Ensenada, Baja California, at a gathering of the Mexican Geophysical Union. This may appear strange, but it may help illustrate in the briefest possible time one point I wish to make here today.

Some of us are repeatedly asked about changes that may be taking place as a result of ocean disposal of radioactive wastes of various kinds. I have personal interest in changes in radioactivities, even the smallest, in the ocean. However, many of the necessary measurements are difficult to make at present, so it is necessary to enlist all sorts of assistance from general oceanographic knowledge.

It occurred to me last week that the Ensenada scientists might be interested in some of the indirect methods we have frequently used in establishing whether or not those radioactive nuclides we have found in our local marine environments might be attributed to a nearby nuclear power reactor.

For several years now we have visited the clean rocky coasts below that Mexican city to collect black sea mussels and other marine organisms as reference samples for making comparisons with samples we collect locally.

Extreme radiation detection sensitivity often may be realized through use of living tissues. However, it is of utmost importance to choose comparable plants or animals and to collect at comparable seasons. Also one must learn something about the origins of the environmental waters.

The objective of that paper was a demonstration that a comparison between the environment near San Onofre (lying 40 miles north of Scripps) and another environment to be found 100 miles south of the border where water is more truly oceanic, requires taking into consideration some large-scale movements of the whole Pacific.

I pointed out incidentally, that it is sometimes helpful to learn also something about the behavior of certain migrating oceanic fish that have added to our knowledge of the retention of certain pollutants in upper ocean layers.

Now, the levels of artificial nuclides in the open Pacific are almost entirely due to global fallout that mostly entered years ago. To decide how much of this has come to our coasts we must consult fallout records and oceanographic information about currents, mixing, and eddies. In short, we have to consider several things that happened a long time ago and far away.

As you will see in that paper, I attempted to summarize as a single final sketch the whole oceanic region that must be reviewed, from Japan to Mexico. However, what fell out was a strong emphasis of the foreground suggesting an exceptionally important part was being played by a more or less permanent countercurrent flowing immediately along our southern California coast. Inside of the large southward directed California current, this countercurrent frequently flows northward from Baja California, past San Diego, then Los Angeles Harbor and even sometimes past Santa Barbara.

This current, of course, is part of a large offshore dynamic eddy; it is variable, but it is fairly persistent.

This is a real feature of our local coast and one not unknown to Mexican oceanographers. However, they were not uninterested because they recognized the pleasing possibility of Mexican citizens at

last finding themselves in a position upstream rather than downstream from pollutants coming from California.

Resentment frequently is heard voiced in Mexico, and was heard again at this meeting, concerning the quality of water now flowing in the Colorado River as it crosses the border.

Our present radiological conditions near California are satisfactory. Along our southwestern coast we have enjoyed a relatively low background of radioactivity. We have much open coast. Several of the past radioactive inputs have simply been stopped. At Hanford, plutonium production was stopped finally in 1971. Dumping of packaged radio wastes stopped in 1966; this waste now all goes over the mountains to Nevada deserts. This costs the University of California, for example, about \$4.50 per cubic foot; and finally, we now have no nuclear fuel processing plants on the coast of the type Dr. Volchok mentioned.

Our radioactive backgrounds now are so low that at some distance from an outfall or from a reactor the small changes that still take place because of occasional French and Chinese weapons testing can be detected in the marine biosphere.

These traces have to be accounted for in evaluating samples collected near sewers and nuclear plants. For example, even the effects of the 1 kilogram of plutonium-238 which burned up in the stratosphere in 1964 in a space vehicle also must be accounted for in any thorough study of plutonium nuclides in the local environments.

This condition, of course, cannot last. The expected increases in populations and the expanding use of nuclear fuels will someday add some all-too-easily measurable, if not entirely acceptable, radioactive burdens to our coastal marine environments.

It has not been well enough stressed, however, that all coastal communities south of Point Conception, which lies somewhat north of Santa Barbara, to points 100 miles or so below the border have interconnected marine environments and that the transfer of pollutants northward by inshore currents can be quite effective.

Also there is now some reason to anticipate that substantial northward flowing waste from nuclear fuel usage below the border may appear at some time in the future. This is because Baja, Calif., badly needs power and because uranium is available.

Baja California has an attractive climate and a beautiful coastline immediately adjacent to us. Near the border, population growth is rapid, and industrial growth also is expected. However, Mexico has a small fuel reserve. It has recently discovered some new oil but its coal resource is poor. The hope for geothermal power has been somewhat disappointing.

However, the same important uranium deposits that are now being strip-mined in Texas extend across the international border and exploitation of these uranium sources in Baja California is reported to be under serious consideration. Geological surveys have already been made along the west coast of Baja California seeking favorable nuclear powerplant sites.

Now, Mexican attitudes and actions concerning radioactivity disposal are not likely to develop along lines we have chosen. They may be guided by international recommendations, of course, but they also may follow a liberal interpretation, for example, the United Kingdom's methods of disposing relatively large quantities of low level radioactive wastes close to shore and into surface water. The United Kingdom has had the longest record of sea surface disposal.

It would be inappropriate to attempt to express here the levels of radioactivity that would be expected along the California coast if, for example, the effluent now coming from a nuclear station such as that one at Windscale, United Kingdom, were released to the sea at a point just south of the border. It will be better to suggest only that should the British disposal method be chosen, then their very thorough environmental survey disciplines also must be insisted upon.

These would have to be carried out effectively on both sides of the border, requiring some international cooperation. The United Kingdom plan is a truly austere one whose major concern is to public health and which explicitly states that possible damage to the environmental resources are relatively unimportant.

It was adopted in 1959, aiming at achievement irrespective of financial cost. However, it does include exploring all possible pathways to humans for each suspected nuclide released to the environment. This hazard-restricting plan just might be expensive to carry out along the border.

Before concluding I would like to make another small point about coastal disposals in general. I add this out of fear that I may have overstressed the fact that a large part of the California coast is still relatively clean.

This may not be true near our outfalls. We are several decades now into the nuclear age, yet we are now finding out that we have kept some of our environmental input records rather poorly.

In fact, there has been a shamefully unnecessary loss of data following construction of our coastal plants, especially regarding the very first outputs and first responses of the downstream environment after the starting of operations. Information of this type is most important for appraising plans for later load expansions.

Incidentally, there is a proposal to expand the San Onofre plant double and then doubled again as soon as possible.

I will recite one final incident that may make clear my point. Somewhat over a year ago I listened to an engineer, associated with one of our oldest coastal nuclear power reactors, describe the features of that plant and its past operating procedures.

This was during a review of plans for beginning some environmental studies. The flow of salt water past this plant, located at the very mouth of Humboldt Bay, alternates with the tides, sometimes going outward immediately into the sea, sometimes coming inwards so as to flood the miles of tidal flats, whose ecological changes now were to be studied in great depth using elaborate computer methods.

I soon realized that this engineer was describing plant operating procedures of the past that did not require any recourse to the tide table. For many years, low level radioactive wastes had merely been discharged at any convenient time. Some flowed immediately out to sea, but another fraction, a fraction apparently completely unrecorded, had flowed with the incoming tide over the mud flats and that now were to be studied ecologically. A record of great value to this study had been lost.

When I asked about this, I was told simply that this was a common practice and that it was legal.

Senator HOLLINGS. Thank you both very much for coming all this way. We are going to leave this record open for some of our other colleagues who may have questions to submit to you by letter.

Thank you very much.

[The statement follows:]

CONDITIONS CONTROLLING COASTAL POLLUTION SUGGESTED BY STUDIES OF EXTREMELY SMALL TRACES OF RADIOACTIVITY NEAR BAJA, CALIF., BY T. R. FOLMOM, SOLEDAD MOUNTAIN LABORATORY, SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.

INTRODUCTION

Many of us who live on the Pacific Coast are uneasy about the gigantic populations that are expected. Large amounts of power will be required and large amounts of wastes will be generated. Traditionally, along any sea coast, wastes go into the sea unless strong objections are raised. In recent years, many people have given serious consideration to means for controlling wastes so that the best possible use may be made of the coastal environment. The oceanographer is often asked how the ocean might respond to increased burdens of wastes. Each specialist has his own manner of attacking this general problem; there are some of us at the Scripps Institution who have specialized in methods for following radioactive traces in moving water masses and in living marine organisms. Some of the specialized procedures are extremely sensitive, detecting minute amounts of radioactive materials. This sensitivity, of course, may be used for giving warning, at the earliest possible moment, that a new radioactive constituent has entered the environment, or that a familiar one has increased in concentration.

Radiometric methods have been used for surveying coastal and oceanic regions for many purposes. Inspection of local areas near nuclear power plants for radioactive contaminations is a well-recognized routine. But it is not widely known how much becomes involved when surveys of this sort are pushed to their extremes so as to derive information as to what may happen in the future over wide areas. It is the purpose of this paper to list a few of the problems that must be faced, to describe some of the controlling features of the oceans that must be recognized, and also to describe some of the behavior of its organisms that must be considered whenever coastal environmental conditions are to be explored with thoroughness for radioactive anomalies. It is hoped that this will suggest new means for studying the basic behavior of, and for making preparation for the control of, other pollutants besides those that can come from nuclear power plants.

In order to recognize any change we must first know the background. Over most of the earth, a radioactive background from remnants of global fallout now must be expected. On land this has been fairly well documented. However, for carrying out an oceanic or coastal radiological survey, we must take advantage of all available oceanographic records and methods if we are to gain even the slightest insight into what background conditions might have prevailed at any period prior to these measurements.

THE PACIFIC VIEWED FROM THE SOUTHWEST CORNER OF CALIFORNIA

In this instance, attention will be given to coastal areas of Southern California and Baja California and to some oceanic waters lying just beyond. First, it is well to form a concept of the behavior of the whole ocean lying westward and northward. From the S.W. corner of the United States we may choose to visualize the N. Pacific moving majestically toward us bringing masses of cold, rain-diluted water from the North. Some of this has also traveled more than 6000 miles from the Japanese coastal regions, mostly along latitudes near 40° N.

However, one must not expect too much from the deeper masses. Far too much emphasis has been given to the great size and great depth of the Pacific. Really, it is much better described as an extremely thin film of water moving slowly across one-third of the earth's surface.

To understand this, we may reflect upon the dimensions of a typical hydrographic office chart of the Pacific Ocean. It is about 3 feet by 3 feet across and its paper is about 4/1000th of an inch thick. Its scale is so large (~20 million:1) that the average depth of the Pacific (~4000 meters) would have to be represented by only 1/2 of the thickness of the chart paper. It is still more startling

to realize that the uppermost layers where most organisms live are, in this sense, so extremely thin that even the thickness of a layer of ink printed on the paper chart would exaggerate them.

These superficial layers moving toward California, not being very thick, cannot by themselves greatly dilute the substances that have entered them. Moreover, there is a growing body of data indicating that certain important constituents of global fallout do not pass rapidly through the moving layers so as to become diluted by deeper water masses. Certain fallout constituents such as ^{137}Cs and ^{90}Sr seem to remain many years in the upper moving layers before dispersing downward. Because of this, these materials may be transported thousands of miles away from the region where they entered the ocean.

An extensive study of the continuously changing patterns of fallout distributions in upper layers of the open Pacific has been carried out at Scripps for more than a decade. Most of this was accomplished by samplings made on "ships of opportunity" using special equipment developed for this program. Several thousand measurements of fallout radiocesium, ^{137}Cs , in the upper layers of the Pacific have been made.

This study of the progress of fallout in the upper layers of the open Pacific has disclosed several large-scale features of this ocean that have been scarcely suspected previously. Moreover, some of the patterns that have been observed in the fallout contaminations in the open ocean have led to better understanding of the great variabilities in backgrounds that have been encountered during investigations of coastal environments. However, in order to interpret even the simpler fallout tagging patterns, it has been necessary to take into careful consideration the characteristics of fallout inputs that have been arriving at various zones of the earth. Global fallout has varied both with time and with latitude.

REPORTED FALLOUT RECORDS

Figure 1 shows reported (1) trends of fallout deposits in terms of the ^{90}Sr constituent that is most commonly monitored. These data have been reduced to a linear (rather than logarithmic) form that permits instant recognition of the two large inputs to the ocean (peaking near 1958 and 1963). In the figure, there has been drawn (from the 1964 input peak) three lines suggesting three rates of attenuation that should be taken into consideration whenever an earlier input (say one during 1964) is to be evaluated in terms of what might remain at a later date. That line showing a 30-year (half attenuation) regression rate corresponds closely to the physical half lives of ^{137}Cs and ^{90}Sr , suggests what might happen if either of these nuclides fell upon dry land or accumulated in a well-stirred reservoir. The other two regression curves labeled $T_{1/2}=15$ years and $T_{1/2}=10$ years were derived from experimental data suggesting probable retention rates in the upper layers of the N. Pacific of chemically-passive trace materials. For example, after 1964 there apparently was so little ^{137}Cs lost from the upper layers in some parts of the Pacific that the large inputs of 1958 and 1963 still dominate the present concentrations of this fallout constituent.

Figure 2 sketches two examples of water mass displacements that have been disclosed by studies of fallout in shallow strata in northern oceanic regions of the Pacific. The heavy lines indicate the major surface currents which bifurcate, one of which turns southward and forms the California Current.

A fallout profile, measured near 164°E , indicates exceptionally high fallout concentrations between 400 to 600 meters. This is consistent with the well-known oceanographic hypothesis (2) concerning the origin of intermediate water masses from the downward sinking of surface waters at latitudes north of 40°N .

Also, an observed trend of surface fallout cesium concentrations has been indicated graphically along the 155°W parallel. The significance of this surface concentration trend will be discussed in connection with Figure 3.

DISPLACEMENTS OF SURFACE WATER MASSES DELINEATED BY FALLOUT

Figure 3 makes use of Pacific surface current vectors that have appeared in one well-known chart (3). At the left hand, along 160°E , has been drawn a simple graph depicting the trend of ^{137}Cs concentrations as these vary (4) with latitude. These have been computed from fallout reports under the hypothetical simplifying assumptions that (1) the integrated fallout at each latitude has mixed uniformly to 100 meters depth, and (2) there has been no lateral motion. It will be seen that a simple concentration maximum appears near 45°N .

This computed hypothetical distribution (similar to what might have been expected on land) may now be compared with actual concentrations measured in 1966 along the tracks of ships going westward to Honolulu and northward to Kodiak. Observed (5) concentration magnitudes were plotted as amplitudes to the right-hand of the ships' tracks.

This suggests that large amounts of radioactivity that fell most intensely near 45°N were displaced by the California Current to a region near the International boundary. This conclusion has been supported by many other radiometric measurements of fallout.

SOME ANNUAL ENVIRONMENTAL REPORTS FROM THE TUNAS

Biological systems often are extremely effective in accumulating easily measurable amounts of radionuclides (and certain other trace contaminants) even when their environment contains concentrations that are very difficult to detect with the most sensitive modern equipment. We have found that certain tissues of the albacore tuna are especially effective in indicating changes in concentrations of certain metallic nuclides in the open ocean. Other marine indicator species that are more convenient to use near the coasts will be discussed further below.

Figure 4 points out the long oceanic route covered by the albacore each year (6).

Figure 5 illustrates several of the organs (7) that are convenient and effective as sources of radionuclide concentrates whose levels appear to follow proportionately the concentrations in the environment. Comparisons between tissue and environmental concentrations are shown in Figure 6(8).

The advantage of the fish method is that it is extremely sensitive, and that it integrates average concentrations in the environment selected by the fish. The disadvantage include the limitations of sampling only at definite places and seasons, and the present knowledge of the area that has been integrated. Too little is known about biological "turnover rates".

Figure 6 shows however that both biological and direct water measurements have indicated consistently that fallout cesium has been retained for long periods in the eastern N. Pacific.

Table 1 lists the apparent residence half-times for different nuclides. It is notable, but not unexpected, that plutonium from fallout is not retained in the upper layers as long as radiocesium.

In passing, it should be said that although albacore, because of their habits, are convenient for monitoring a number of radionuclides in the sea, the levels of artificial radioactivities found in their tissues are always exceedingly low, threatening no hazard to humans. This is likewise true of radioactive concentrations which we have sought out in certain sessile algae and used for monitoring extremely small changes in radioactivity in the coastal marine environment.

COMPLICATIONS TO OCEANIC BIOLOGICAL SURVEYS

Figure 7 is offered for comparison with Figure 2 to illustrate the greatly different depths to which fallout penetrates at diagonally opposite sides of the Pacific. These both are extremes. However, both indicate that trace element concentrations may vary greatly with depth, indicating one or more striking maxima at shallow depths. A description of conditions at these stations, such as shown in Figure 7, can scarcely be complete without tabulating or graphing a dozen or more concentrations.

When it is recognized that the thin strata carrying these concentration maxima probably have been moving laterally, even more than a thousand miles, it can be understood how difficult it is to make sure that a reproducible characteristic of a given environment has been determined, even by purely physical means. Using biological indicators may add other unknown factors; on the other hand, there is also a simplification afforded by the fact that many species seek out and prefer to dwell in a limited number and presumably definite classes of habitats. Each might be used, therefore, as a reporter representing its own environment, whatever that is.

Figure 8 is offered as a reminder of how much is involved when environmental conditions near Los Angeles, San Diego and Ensenada, for example, are to be compared. It is now recognized that the large, oceanic California

Current usually bends closest to the continent somewhat south of Ensenada, and that inshore currents most commonly run northward past San Diego and Santa Monica. Environmental consequences within the large embayment called the "Southern California Bight" are now being given extensive and serious professional study by a "local governmental agency for marine ecological research" called the Southern California Coastal Water Research Project (9). Reports from this program, together with earlier radiological measurements in coastal organisms are emphasizing how close together are some of the adjacent communities, and how peculiarly isolated are some of these from truly oceanic water.

Table 2 and Table 3 indicate some characteristic nuclide concentration gradients that have been observed in a N-S and E-W survey across this Bight.

It has been quite evident that organisms collected in Northern Baja California accumulate those nuclides and trace elements that are characteristic of the open ocean. In the past, this has included the type of fallout nuclides which have come south with oceanic currents.

It seems to be evidenced also that much of the future wastes from the upper California communities will flow southward along a general course passing far to the west of the growing communities of Baja California.

Finally, the nuclear power plant at San Onofre which is sited almost exactly half way between San Diego and Los Angeles may now, in the sense of the large scale picture just presented, be suspected as having a "half way oceanic" exposure. We have followed with interest some of the small radioactive changes that have occurred in its local marine environment. Table 4 lists several marine species that have been inspected, and also three nuclides whose relative concentrations suggest their origins are not from the oceanic transport of global fallout. We have made use of several biological concentrators, but for reasons apparent from what has been said, we have made it a practice to make comparisons with conditions in identical species collected in coastal areas below Ensenada.

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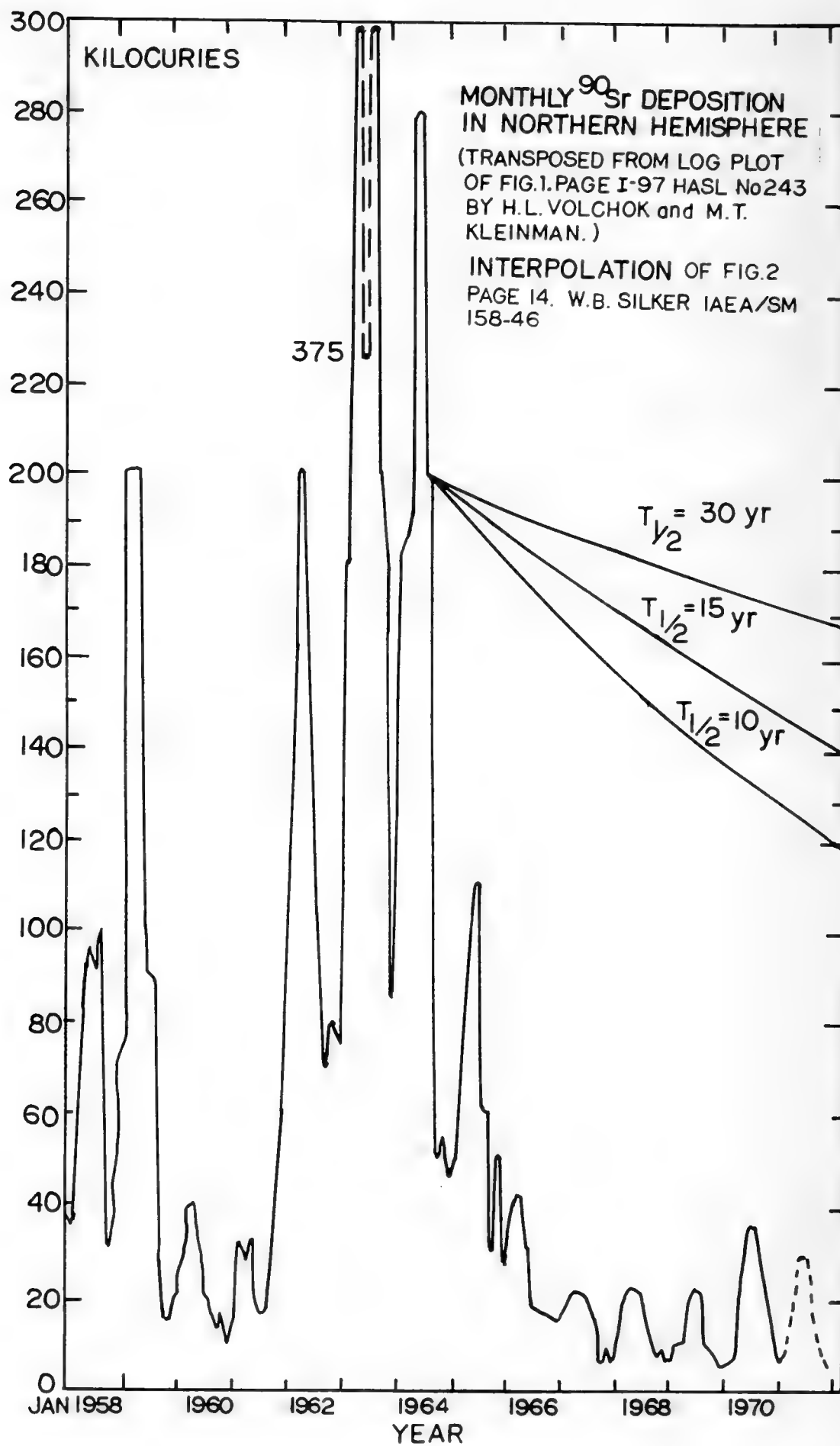


FIGURE 1

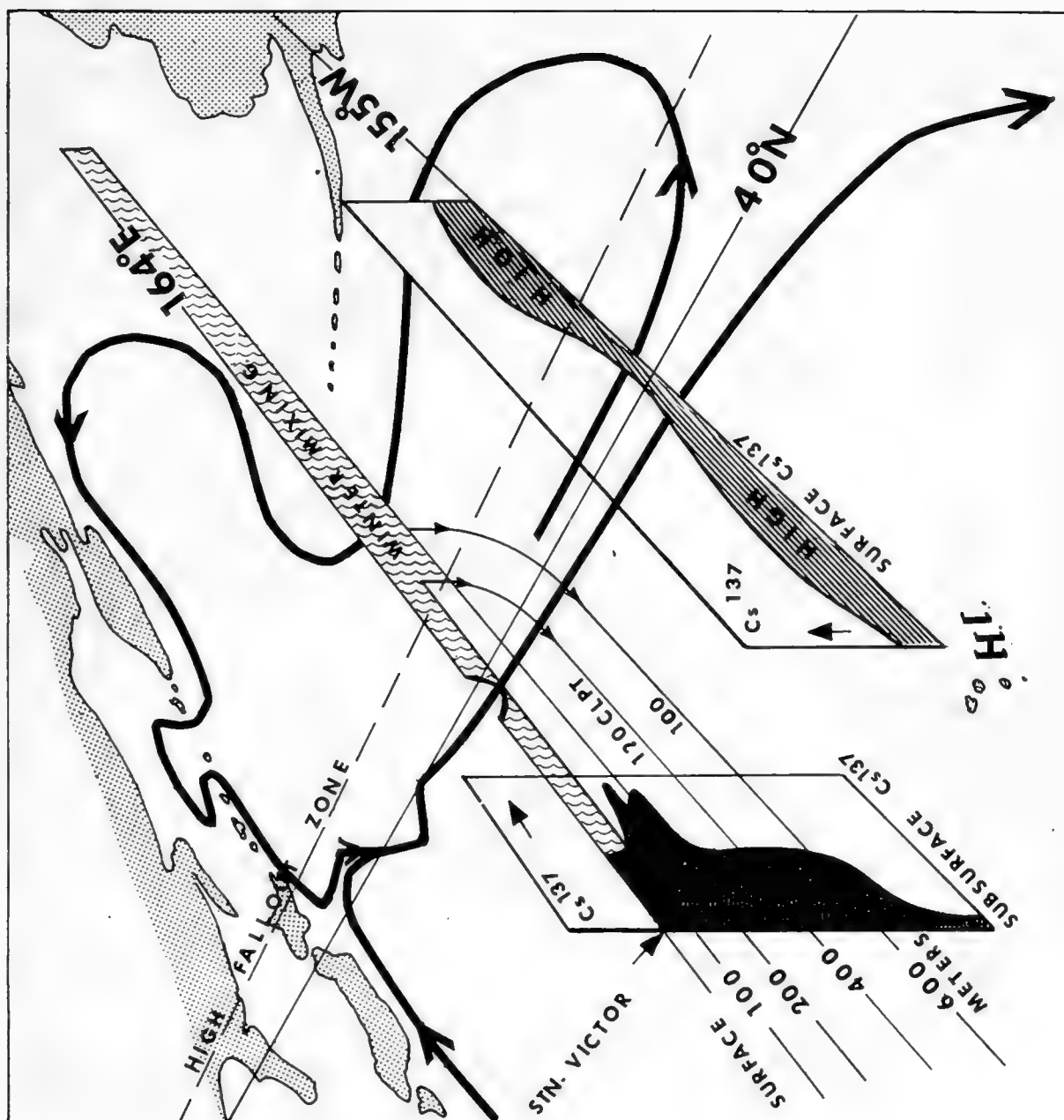


FIGURE 2

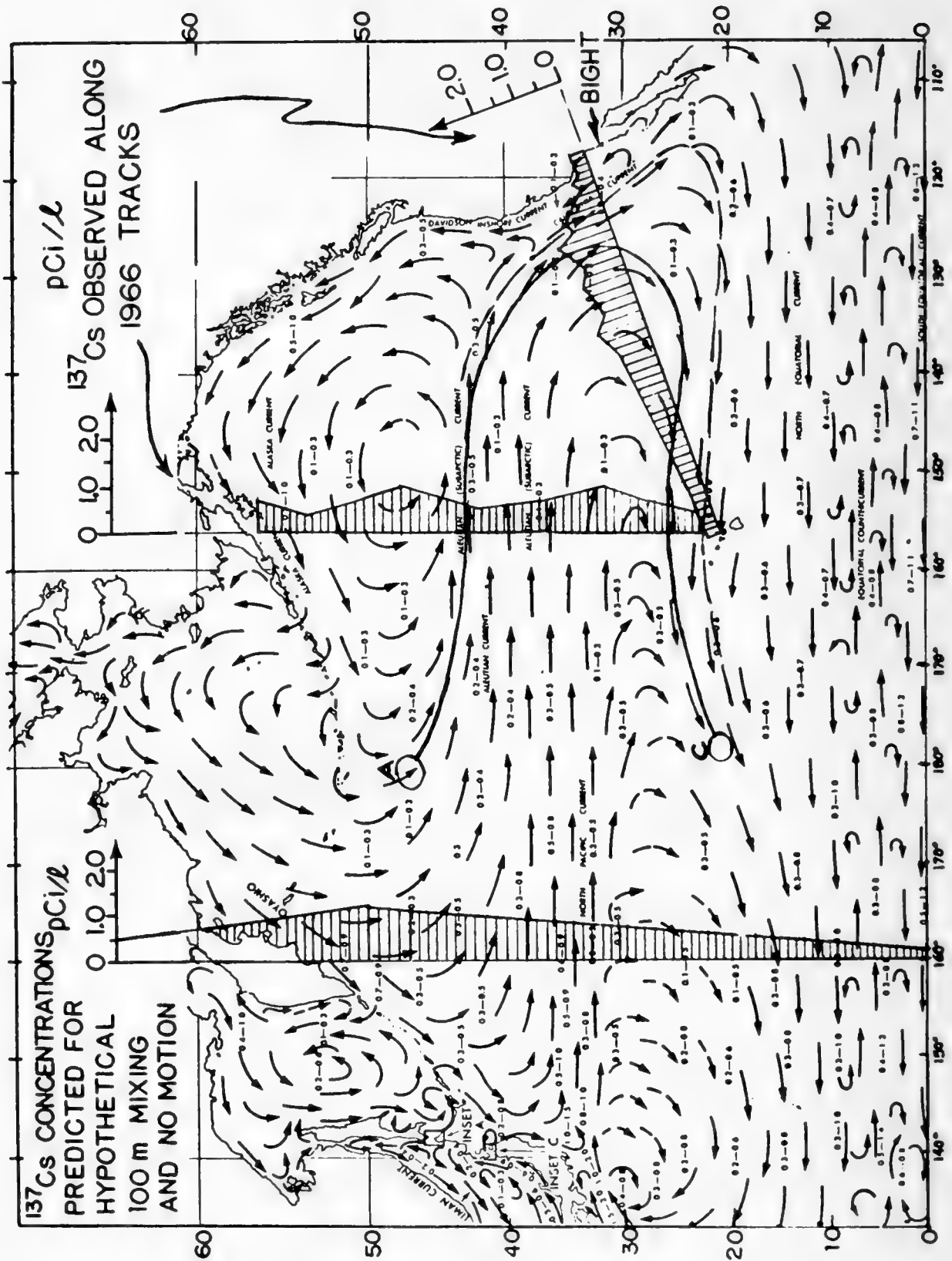


FIGURE 3

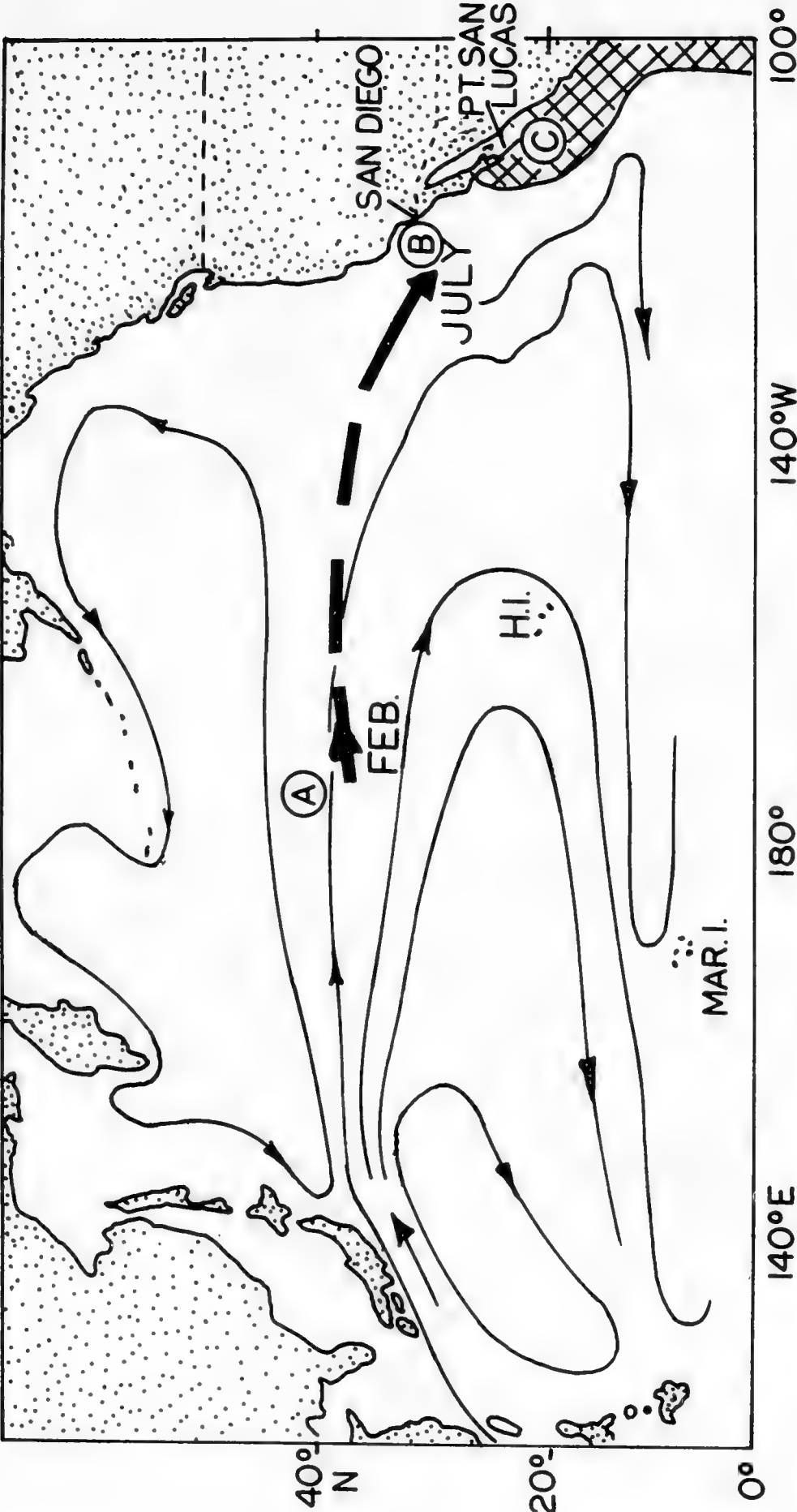


FIGURE 4.—Supposed route (heavy dashed lines) of the annual migration of individuals of the N. Pacific albacore population from a central oceanic region, A, beginning about February to the earliest American fishing ground, B. Simplified Pacific circulations are shown by the lighter lines with arrows.

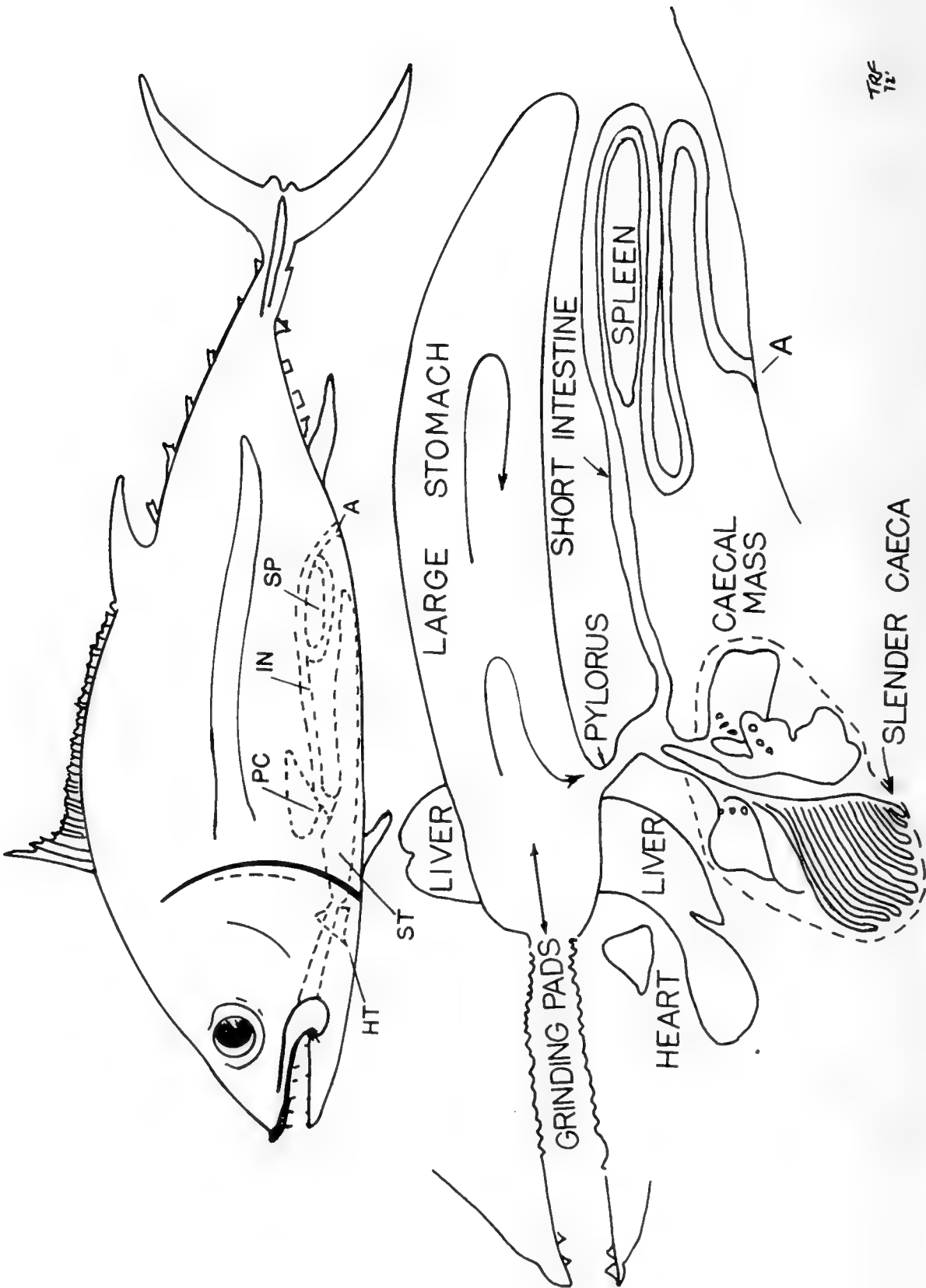


FIGURE 5.—Features of the digestive tract of the N. Pacific albacore, *Thunnus alalunga*, of interest to the study of ^{210}Po distributions.

Concentrations of ^{137}Cs in muscle and liver tissues of albacore tuna caught off San Diego and N. Pacific waters 1964-1971.

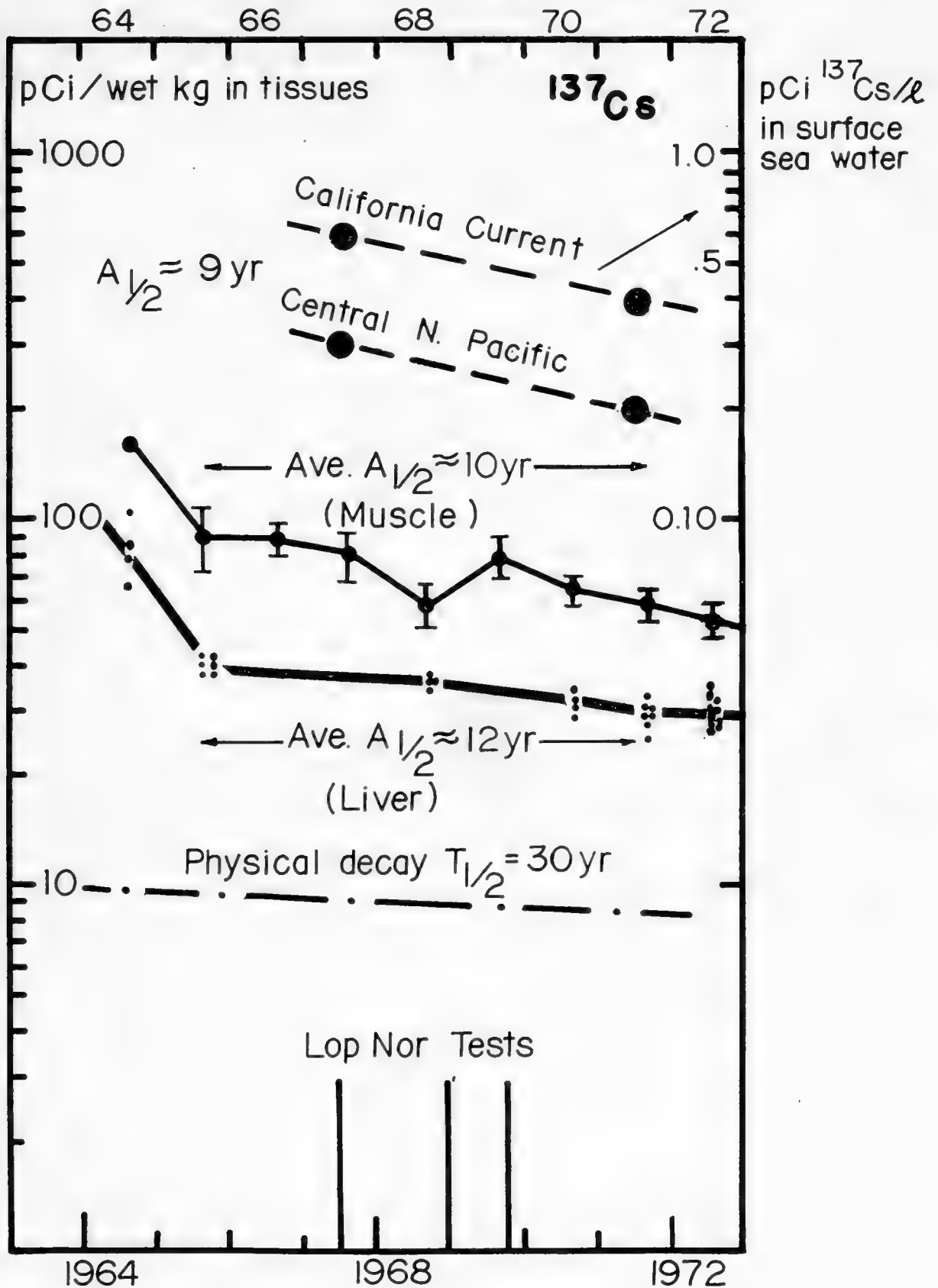


FIGURE 6

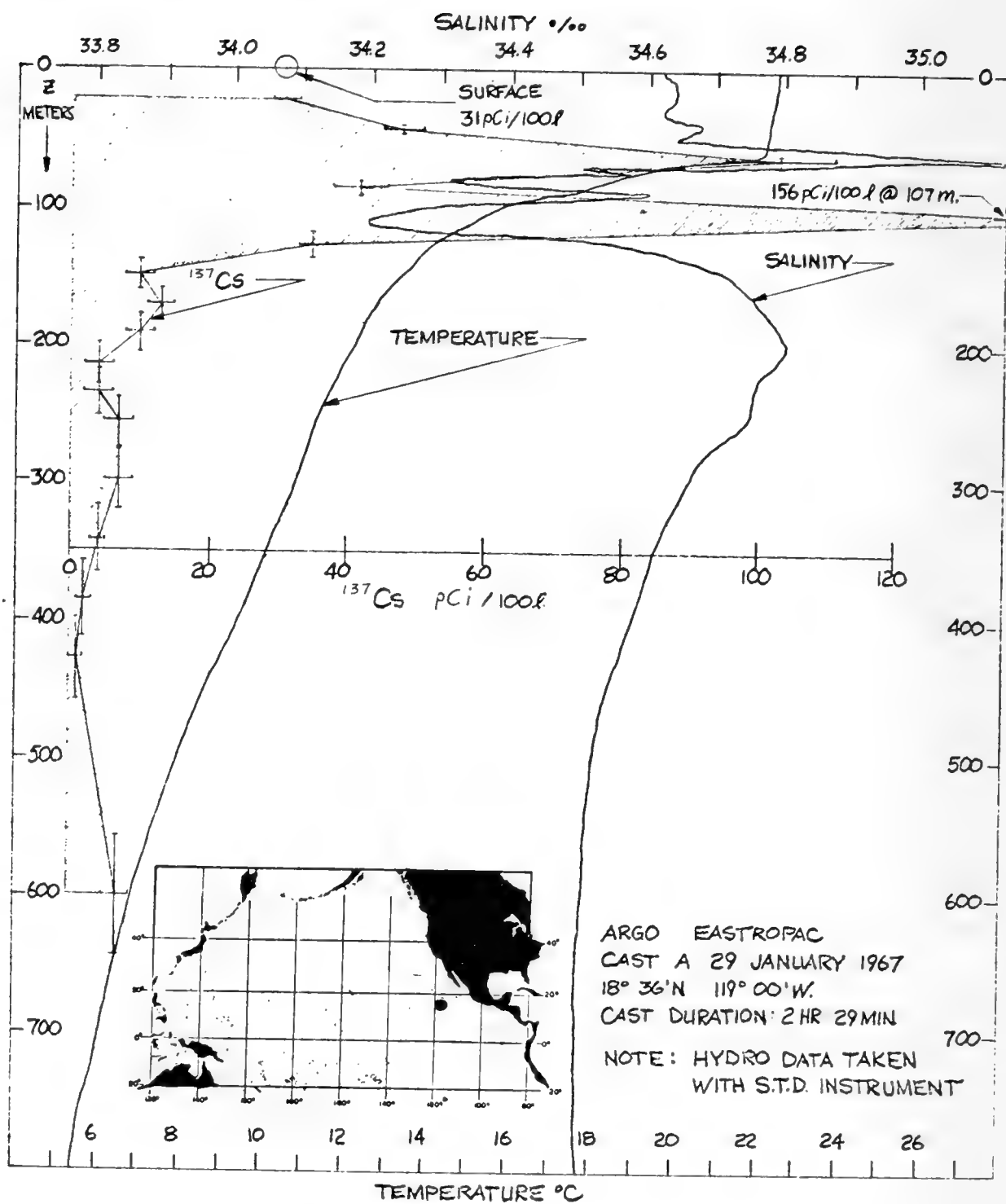


FIGURE 7

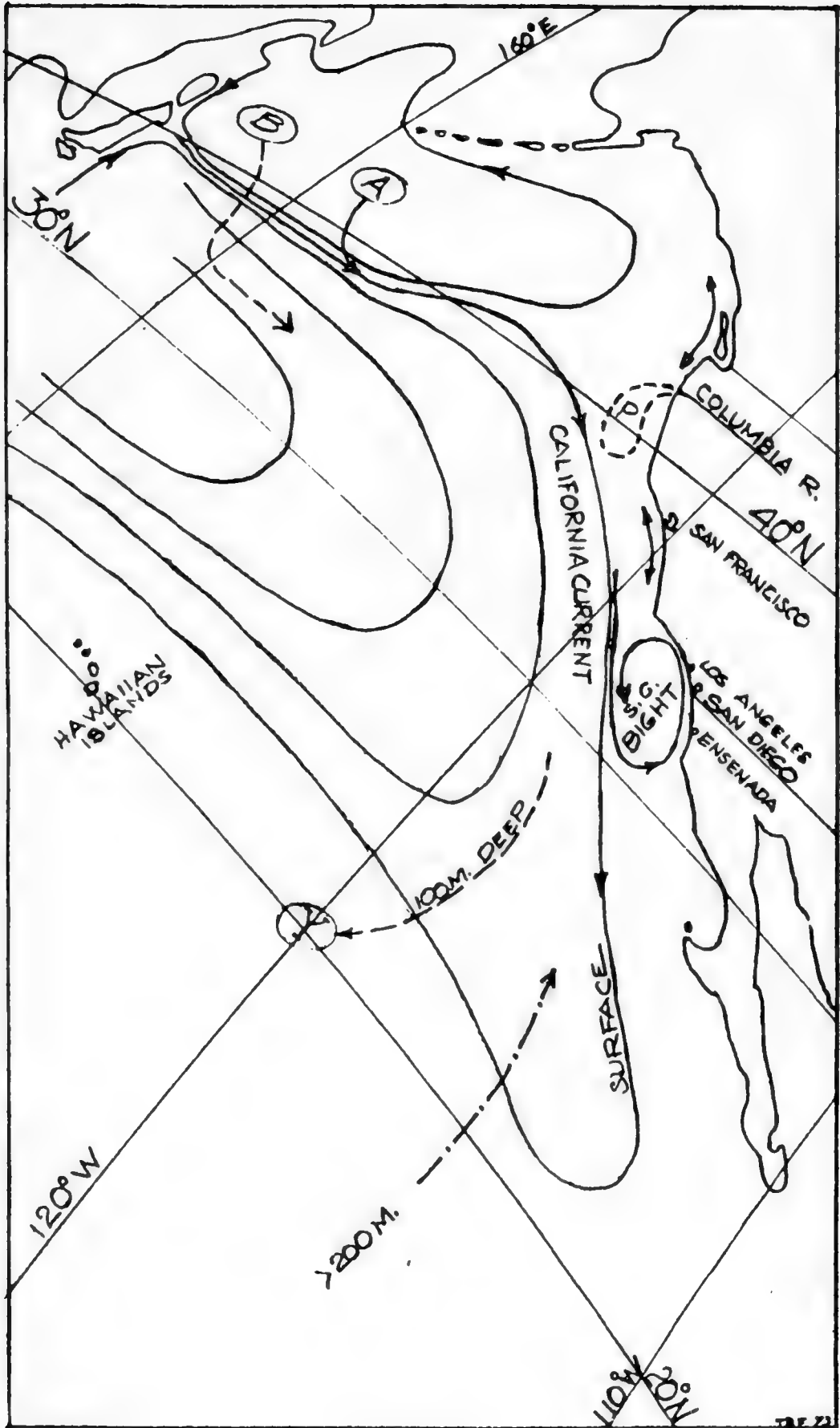


FIGURE 8

TABLE 1.—RESIDENCE TIMES OF 4 DIFFERENT RADIONUCLIDES IN THE UPPER OCEAN INDICATED BY STUDIES OF OCEANIC TUNAS

Nuclide	Corrected ¹ half-time (years)
⁶⁰ Co.....	5.0
^{108m} Ag.....	7.4
¹³⁷ Cs.....	17.0
²³⁹ Pu.....	3.5

¹ Corrected for radioactive decay.TABLE 2.—VARIATIONS OF ²³⁹Pu, ⁹⁰Sr, AND ¹³⁷Cs OBSERVED GOING WEST FROM CALIFORNIA IN THE NORTHEAST PACIFIC IN 1964 (CROSSING THE NORTHERN PART OF THE BIGHT)

Station	Miles from coast	pCi/\$ sea water		
		²³⁹ Pu	⁹⁰ Sr	¹³⁷ Cs
Scripps Pier.....	0.....	0.004		0.12-0.46
815-475.....	30 (south of Point Arguello).....	.0011	0.055	.09
762-50.....	10 (north of Point Arguello).....	.0011	.097	.16
80.70.....	100 (west of Point Arguello).....	.0014	.19	.27
70.120.....	300 (west of Point Arguello).....	.0015	.37	.59
60.190.....	700 (west of Point Arguello).....	.00316	.57	.66
60.200 (U ₀).....	720 (west of Point Arguello).....	¹ .00259		
"November".....	1,100 (1,400 west of San Diego).....	.0030	.37	.48

¹ Sample from station 60.200 only 20 miles away from station 60.190.

TABLE 3.—EXAMPLES OF ENVIRONMENTAL VARIATIONS INDICATED BY MARINE ORGANISMS IN THE CALIFORNIA BIGHT REGION

A. ⁶⁵Zn IN MYTILUS CALIFORNIANUS (BLACK MUSSEL)

Location	pCi/Kg wet	
	May 1963	February 1964
Pt. Dume, Calif.....	50	
Santa Monica, Calif.....	23	
Laguna Beach, Calif.....	34	
Oceanside, Calif.....	26	
Solana Beach, Calif.....	21	
La Jolla, Calif (Scripps).....	48	32
Pacific Beach, Calif.....	50	
Pta. Banda, B.C.....	133	
Pta. Calaveras, B.C.....		106
Pta. de Cabra, B.C.....	105	
Cabo Colnett B.C.....		125
Pta. Baja, B.C.....		82
Pta. San Carlos, B.C.....		50

B. ⁶⁵Zn IN POLLICIPES POLYMERUS (GOOSENECK BARNACLE)

Location	pCi/Kg wet February 1964
La Jolla, Calif (Scripps).....	30
Pta. Banda, B.C.....	81
Pta. Calaveras, B.C.....	120
Cabo Colnett, B.C.....	94

TABLE 4.—MEASUREMENTS MADE NEAR SAN ONOFRE NUCLEAR POWER STATION SUGGESTING A LOCAL SOURCE OF ARTIFICIAL RADIOACTIVITIES¹ (USING ORGANISMS COLLECTED AT SAN ONOFRE PEBBLE REEF)

Sample and date collected	pCi ² /Kg wet weight		
	⁶⁰ Co	⁵⁸ Co	^{110m} Ag
Sea hare (<i>Aplysia californica</i>):			
Dec. 12, 1970.....	85	2260	114
Mar. 10, 1971.....	63	734	78
June 22, 1971 ³	16	87	16
Oct. 4, 1971.....	45	125	49
Jan. 7, 1972.....	7	12	12
Dec. 18, 1972.....	34	64	195
Agar Agar (<i>Gelidium</i> sp.):			
Dec. 12, 1970.....	24	313	35
Mar. 10, 1971 ³	5	44	6
Nov. 2, 1971.....	4	11	13
Surf Grass (<i>Phyllospadix</i> sp.):			
Mar. 10, 1971 ³	31	426	42
Nov. 2, 1971.....	21	42	25
Jan. 17, 1972.....	9	15	14
Dec. 18, 1972.....	58	160	85

¹ Other nuclides studied include ²²⁸Ra, ²³²Th, ²¹⁰Po, and ²³⁹Pu. Plutonium ranged 0.44 to 1.65 pCi/wet Kg in seaweeds but these levels might be attributed to fallout.

² Averages of measurements whose counting errors are 10 percent or better.

³ <1 pCi/wet Kg of ⁵⁸Co and ^{110m}Ag are present in sea hare, agar agar, and surf grass collected at La Jolla on these dates, ⁶⁰Co concentrations are 2, 5, and 9 pCi/wet Kg respectively.

Senator HOLLINGS. The committee will be recessed until 10 o'clock tomorrow morning.

[Whereupon, at 12:40 p.m. the committee recessed, to reconvene at 10 a.m., Wednesday, June 13, 1973.]

OCEAN POLLUTION

WEDNESDAY, JUNE 13, 1973

U.S. SENATE,
COMMITTEE ON COMMERCE,
SUBCOMMITTEE ON OCEANS AND ATMOSPHERE,
Washington, D.C.

The committee met at 10 a.m., in room 5110, Dirksen Senate Office Building, Hon. Ted Stevens presiding.

Senator STEVENS. We will call the meeting of this committee to order. This morning we have a panel of scientists from the National Oceanic and Atmospheric Administration.

We are most pleased that you could be with us. My colleagues will join us after meeting in the executive session here.

Dr. Allan Hirsch, Director, marine ecosystem analysis program, Office of Coastal Environment; Dr. M. Grant Gross, Oceanographic Services, Office of Associate Administrator for Environmental Monitoring and Prediction; and Dr. William F. Royce, Associate Director for Resource Research, National Marine Fisheries Services. We are delighted to have you here, gentlemen, to make the record we have to have to proceed with the committee's business. How do you desire to proceed with your statements?

STATEMENTS OF DR. ALLAN HIRSCH, DIRECTOR, MARINE ECOSYSTEM ANALYSIS PROGRAM, OFFICE OF COASTAL ENVIRONMENT; DR. M. GRANT GROSS, OCEANOGRAPHIC SERVICES, OFFICE OF ASSOCIATE ADMINISTRATOR FOR ENVIRONMENTAL MONITORING AND PREDICTION; AND DR. WILLIAM F. ROYCE, ASSOCIATE DIRECTOR FOR RESOURCE RESEARCH, NATIONAL MARINE FISHERIES SERVICES

Dr. HIRSCH. We have several statements, and we would like to proceed from left to right, if we may.

Senator STEVENS. Thank you very much. You may proceed.

Dr. HIRSCH. Mr. Chairman, I am pleased to be here today to discuss NOAA's New York bight marine ecosystems analysis project.

The New York Bight is the ocean area extending from the tip of Long Island to about Cape May, N.J., and out to the edge of the Continental Shelf. The bight is perhaps the most complex and heavily impacted coastal marine area in the United States.

It is the ultimate repository of many of the wastes of the New York-New Jersey metropolitan area. It receives those wastes from river inflows—such as those of the Hudson and East Rivers, Raritan River, and from direct discharges. It receives them from barges which dump the area's wastes at sea.

It is with respect to ocean dumping that the New York Bight has received its greatest notoriety. Although there are well over 100 active dump sites in the United States, the bulk of this practice of barging municipal and industrial wastes to sea takes place here.

In the New York Bight this has resulted in substantial environmental impact and considerable public concern.

Dumping is now being regulated under the provisions of the Marine Protection, Research and Sanctuaries Act of 1972. But regulatory authority will not in itself answer the problems associated with ocean dumping. The alternatives available to the present practices must be considered.

For example, should incineration of wastes be recommended as an alternative to ocean dumping? If so, air pollution must be taken into account. That seems particularly significant in this metropolitan area, where very stringent measures will be required to meet existing air quality standards. If land disposal is to be adopted as an alternative to ocean dumping, how, where, and at what cost can this be done?

Under the best of circumstances, development of alternatives to ocean dumping will take some time. Therefore, at least for the immediate future, ocean dumping practices will continue. The question is, how can those practices be conducted to assure minimum impact on the marine environment?

Regulatory agencies will have to ask themselves whether to continue to dump the wastes at the present locations for at least some interim period, since present locations are already degraded. Or should these wastes be moved farther out and discharged off the Outer Continental Shelf into deeper, but as yet unimpacted waters? Or should some other alternative sites be utilized?

These will be difficult choices. But the fact is, the residual wastes requiring ultimate disposal will increase as our waste treatment improves in accordance with the requirements of the Federal Water Pollution Control Act and State and local control programs.

Greater quantities of sludge will develop and in coastal areas the question of ocean dumping or alternatives to ocean dumping will continue to be a pressing one.

Ocean dumping, however, is just one issue facing decisionmakers in the New York Bight. What about the development of offshore structures—deepwater ports, airport extensions, and nuclear generating facilities?

What about the development of sand and gravel resources to meet the burgeoning needs of megalopolis for construction materials? What impact will these uses have on both marine environment and associated land use patterns?

These decisions will have to be made with respect to an area which has enormous recreational use and potential—perhaps best symbolized by the recent establishment of the Gateway National Recreation Area. It is an area of great value for sport and commercial fishery resources. And it is an area of great overall ecological importance—both as a natural system and as an environment for man.

Despite its importance, however, and despite many studies, the New York Bight is also one of our least understood environments. We really know relatively little about its behavior or how it would respond to various man-made alterations.

For example, it had been noted years ago that lenses of cold water move shoreward during summer months off the south shore of Long Island. But only very recently has it been recognized that this could have enormous implications for the design of sewage disposal systems for the communities on Long Island. This is just one example of the need to better understand and interpret these oceanic phenomena.

This spring the NOAA launched a major 5-year prototype project to study the New York Bight. This is entitled the "Marine Ecosystems Analysis—MESA—New York Bight Program." The objectives of the project are (1) to develop a better understanding of the physical, chemical, and biological properties of bight; (2) to assess the impacts that man is having on the system; and (3) to improve our ability to predict the consequences of man's actions.

The project will attempt to establish environmental baselines for the bight. It should tell us something about the distribution of fish, shellfish, and bottom organisms. It should establish the basic speed and direction of current movement—a critical mechanism in the transport of pollutants.

It should tell us something about the patterns of plankton development and how the bottom sediments are distributed. It should tell us where areas of high wave energy are located that could interfere with shoreline development or construction of offshore structures.

We will address and hope to answer such questions as the overall source, fate, and effect of certain critical contaminants in the New York Bight.

For example, how much toxic metal is getting into the bight and from where? We will expect to study the contribution of river inputs to the system. We will address the question of how these metals behave in the system and where they go.

How much of the total input is transported through the water column and out of the system into the deeper ocean? How much is deposited in the sediments and at what rate does it move and where?

And how much is taken up in the biomass? Ultimately, then, we must ask what the effect of these materials is on the ecosystem, and if these quantities are projected to increase over the years, what effect will that have?

If we can answer such questions, we will have provided information which will guide long-range management decisions on the use of the bight.

Many NOAA scientists in academic and other institutions supported by NOAA funding will be involved in this study. In addition, many other agencies, Federal, State and local, and research institutions are already involved in studies of the New York Bight in their own right.

These include, for example, the EPA the Corps of Engineers, the New York City Environmental Protection Agency, the New York Ocean Sciences Laboratory and so on.

So we are in the process of establishing a coordinating committee. This committee will fulfill, we hope, two basic tasks: It will provide a focus for coordinating ongoing scientific studies. Perhaps even more important, it will serve as a basis for identifying the needs of users for information on the bight.

The basic purpose of the New York Bight MESA project is to provide understandings which will guide future decisions concerning

management of the resource. Management agencies and decisionmakers are myriad. They range from a Federal regulatory agency deciding where to permit the dumping of wastes, to a county planning commission zoning coastal lands, to a citizens group deciding how to take a stand on an important public issue.

We intend to determine as best we can the decisions and issues that will be confronting managers and the public, and the marine environmental information needed to guide those decisions. In this way, we hope that the MESA project will not only provide some more basic understandings about man's impact on the marine environment, but will also serve as an important tool in coastal zone management.

That concludes my statement.

Senator STEVENS. Thank you very much, Doctor. I am told by the staff that the President's Advisory Council on Water Quality held a 3-day session in New York last fall and that a scientist from NOAA's Sandy Point Lab said that the New Jersey recreational beach waters were increasingly polluted because of the dumping by the city of New York. In view of this, could you tell us why these permits are still being issued to dump in that area?

Dr. HIRSCH. Well, I will attempt to answer that in two ways, Senator. I believe that there are a variety of sources of coliform organisms impacting the beaches in the New York area, not only ocean dumping, but the effluent discharges and storm water overflows that occur on the shoreline and from the Hudson River itself.

So I think the exact source of the contamination is still subject to some question, and that is one of the things we have to examine in greater detail with this project.

Second, the question that really faces the regulatory agency in making a decision is whether or not to continue to dump for some interim period in an area which is already impacted, or whether to go out and dump for that period in an area which is presently unimpacted, for example, the edge of the Outer Continental Shelf.

We are right now working with EPA in trying to take a look at the area at the edge of the Outer Continental Shelf to at least establish some sort of basic understanding of the environment out there in the event that they decide to move those wastes to that point.

The basic decision is EPA's and not ours, but our role is to help provide the scientific basis for understanding the effect of that decision.

Going back to the initial thrust of your question, Senator, I think it is not entirely clear as to the source of all the coliform organisms. It is clear they are increased by ocean dumping, but whether the contamination on the beaches is the result of ocean dumping or substantially the result of other sources of contamination is one of the things we have to be more firm on before some of these long reaching management decisions are made, and that is why we are engaged in the study.

Senator STEVENS. I remember one hearing where I was giving some statistics about the amount of oil wastes that come off the streets of New York just in washing the streets, and in washing down gas stations and things like that. Have you done any research to determine how that is disposed of?

Is there any means for cleaning it up before those waters are polluted in the offshore areas?

Dr. HIRSCH. Not storm water. There have been studies of storm water control in New York City, and there is one pilot storm water treatment plant being operated in New York near Jamaica Bay, and that plant is an effort to demonstrate what can be accomplished by treating these waters that run off the streets.

By and large they are not treated. They simply either run into the river, or pass through an overflow system or something of that nature.

Senator STEVENS. Is there any study on the tests of that water, how much petroleum is in those waters, if you know?

Dr. HIRSCH. I believe there are analyses, but I will have to provide that for the record.

Senator STEVENS. Would you do that? I think that is going to be an important thing for us to try to keep track of, the extent to which there is pollution from these everyday uses that people don't even consider.

[The following information was subsequently received for the record:]

CONCENTRATIONS OF OIL IN NEW YORK CITY STORMWATER

Studies of oil concentrations in stormwater from New York City have been conducted by the Interstate Sanitation Commission under contract to the Environmental Protection Agency, and by consultants for the New York City Department of Water Resources.

The Interstate Sanitation Commission Study¹ sampled flows from a combined sewer system serving a mixed residential-industrial area. The study showed that concentrations of oil and grease in the sewage flow during dry weather periods ranged from about 9 to 53 parts per million. In wet weather periods, concentrations of oil and grease as high as almost 9,000 parts per million were observed.

A New York City Department of Water Resources study² sampled flows from a residential area draining to Jamaica Bay. Dry weather flows contained about 5 parts per million; while wet weather flows were as high as 95 parts per million.

These studies indicate that substantial increases in oil discharges occur during wet periods. These increases can stem from oily wastes retained in sewers during dry weather flow and from street and surface run-off. It should be noted that these wastes represent oils and greases of various sorts, and not only petroleum wastes associated with gas stations and automotive sources.

Mr. HIRSCH. To elaborate on that point, Senator, I think that is the type of information we are trying to get from our project. There have been studies of many individual and obvious sources of oil and other contaminants.

We want to know in an area like the New York Bight what is the total loading, where is it coming from, and where is it winding up. How significant is this oil you are mentioning as contrasted with oil from a tanker operation?

Senator STEVENS. The tanker is obvious and the other is not obvious.

What about the studies going on along the rest of the coast? Where else are we doing research other than the New York Bight?

Dr. HIRSCH. There is work of a somewhat similar nature in Chesapeake Bay being funded by the NSF being done by some Chesapeake

¹ Combined Sewer Overflow Study for the Hudson River Conference. EPA-R2-73-152. January, 1973.

² Draft Report on Year One of the Spring Creek Auxiliary Water Pollution Control Project. Department of Water Resources. New York City, May, 1970.

Bay Consortium, which is a group of universities and the Smithsonian Institute.

There is work in Delaware Bay of a somewhat similar nature again being funded by a grant through the National Science Foundation.

There is work, a somewhat similar kind of work, but I think not nearly so comprehensive, in various other parts of work to a limited extent in Prince William Sound.

Senator STEVENS. How about the funding of it? Is it adequately funded? The Appropriations Committee and you are not under any orders in the OMB, I hope.

Dr. HIRSCH. We always operate under certain constraints from the Office of Management and Budget. This program is funded at \$2.3 million in 1973. It is a new program.

Senator STEVENS. For the New York Bight?

Mr. HIRSCH. No, for the entire program. Of that, I would estimate that somewhere in the range of \$1.8 million, \$1.9 million would be going to the New York Bight.

Senator STEVENS. \$1.8 million of the \$2.3 million?

Dr. HIRSCH. Yes, approximately. The remainder will be used for some advance planning and background studies for future comprehensive studies of this sort in Prince William Sound, Alaska, and possibly in Puget Sound, and so forth.

Senator STEVENS. I appreciate that very much. Just as an aside, do you have any memory of figures of the amount of pollution that is coming out of those sewers, how many parts per million would be petroleum?

Mr. HIRSCH. I do not. Let me ask my colleague, Dr. Gross.

Dr. GROSS. No, I do not have that information.

Senator STEVENS. Thank you very much, Dr. Gross. Do you have a statement?

Dr. GROSS. Yes, sir. Thank you very much, Mr. Chairman, it is a pleasure to be with you this morning to discuss technological aspects of NOAA's efforts to control pollution.

My colleagues have already discussed the nature of ocean pollution problems. Clearly, we have cause for concern in specific ocean areas and a need to keep an eye on marine pollution problems on a global scale lest the problems become vastly more serious through our lack of concern. I would like to point out that NOAA is now working to develop monitoring techniques for marine pollution in two ways:

1. Through application of environmental sensors on satellites, buoys, ships, and other platforms;

2. Through development of appropriate institutional arrangements so that the nations of the world can pool their resources to tackle marine pollution problems.

Satellites and the sensors they carry vastly expand our capabilities to deal with marine pollution on a global scale. In addition to carrying the sensors for remote sensing of the marine environment, satellites also provide needed communication to relay environmental data from monitoring platforms at sea and in other remote locations.

In cloud free areas, sensors carried by satellites can often spot large oil slicks and discolored water on the ocean surface providing an indication of the presence and extent of these pollutants. They do this much quicker and provide better coverage than traditional surveys

carried out on ships. For instance, the Earth Resources Technology Satellites (ERTS) has photographed a dump of waste acids in the New York Bight.

Equally important, satellite sensors provide new tools for studying basic processes that transport, dilute and eventually disperse pollutants in the ocean. For example, we know little about the processes by which polluted waters of the Continental Shelf are carried out into the deep ocean to be diluted and dispersed.

With better knowledge of these processes, we can more effectively use the ocean to dilute certain types of relatively harmless wastes. We can also more effectively cope with pollutants released by accidents. In short, satellites give us a whole new vantage point from which to tackle pollution problems.

Environmental data buoys provide another means of more effectively coping with marine pollution. Data buoys are now providing the National Weather Service with observations of weather at sea to improve forecasts in the Gulf of Alaska, Gulf of Mexico, and off the Carolina coast.

Obviously, better weather forecasts and warnings of hazardous conditions help to increase safety of ship and plane operations and significantly reduce spills due to weather-related accidents. And better information about weather at sea and oceanographic conditions will help to provide predictions of movements of pollutants—such as oil slicks—to assist cleanup efforts at sea and on the beaches when they come ashore.

Work is also underway to adapt sensors for use on data buoys so that they may in the future be used to measure critical ocean properties and provide an indication of ocean pollution.

One example: The proposed development of the Alaskan oil fields and the proposed building of the Trans-Alaska Pipeline System (TAPS) has resulted in the study of all of these techniques to assist the marine operations necessary to carry Alaskan oil to U.S. Pacific ports.

Information gained from satellites will also be made more available in the Alaskan region to assist ship operations, spot pollution problems, and provide data needed for planning and conduct of cleanup operations.

But it isn't enough to have data or information or baseline assessments. We must have suitable institutional arrangements that permit us to effectively use our resources properly, drawing when possible on the lessons learned by other nations. Nations must also be able to pool their resources to cope with problems that cross national boundaries or become too large for a single nation to handle.

One international program is already underway which promises to assist in our efforts to monitor marine pollution. The IGOS program (Integrated Global Ocean Station System) has already been collecting information about ocean temperatures from ships of many nations and relaying the data to national centers where the information is used to improve weather and ocean forecasts.

Similar programs are now planned for a marine pollution pilot project under IGOS. The expected date for the beginning of that program is now set for something like June 1974. Under that program, ships will report sightings of oil slicks and flitable debris at sea to provide a measure of the severity of ocean pollution problems.

Other ships—primarily research vessels from universities and fisheries vessels—will use special nets to collect floating debris; plastics and tar balls, for weighing and analysis in laboratories ashore.

As the system is proposed, it may be expanded to other more complicated procedures. In this way, the world's fleet can be used to assist in the detection of marine pollution in the shipping lanes—where pollution problems are most likely to arise.

Another international cooperative program just begun is the global investigation of pollution of the marine environment, GIPME, of the Intergovernmental Oceanographic Commission. This is a cooperative program of scientific research concerned with marine pollution, carried out primarily in the national laboratories of the cooperating nations. It deals with sources and inputs of pollutants into the ocean, their transfer and transformation by physical, chemical and biological processes, their effects on marine organisms, and their fate in the marine environment.

The investigation is directed primarily toward the coastal ocean and—where appropriate—toward the open ocean. It takes into account the consequences of marine pollution; especially those related to human health, living resources, and their exploitation, climatic effects and amenities as well as more indirect ecological effects. Finally, GIPME and its various national programs provides the basis for global programs of marine pollution monitoring.

In addition to its major research efforts on regional problems, GIPME will also provide an assessment of the present state of the ocean—a report on the health of the ocean, so to speak.

One example of the Nation's commitment to international efforts is the International Field Year in the Great Lakes, IFYGL. In that program, which is completing the field observation phase, we and the Canadians have joined together to study the dynamics and water quality of Lake Ontario. Analysis of the information from the project will continue for some time. But we believe that it will be invaluable in forecasting long term responses of the lake to man's use and management.

By the effective use of NOAA's ships, selected ships-of-opportunity, satellites, and environmental data buoys combined with those from other nations, we can expect to further use the resources of the ocean to meet national needs and at the same time to protect the world ocean from the abuses of marine pollution.

Thank you, Mr. Chairman.

Senator STEVENS. Do you have any questions, Senator? I have a couple if you don't.

Senator HOLLINGS. You go ahead. I wanted to ask Dr. Royce a couple of questions on things we were getting into yesterday.

Senator STEVENS. Dr. Hirsch, I was told recently that the state of the art, as far as removing oil from ballast water is about the level of 10 parts per million. Is that correct?

Dr. GROSS. I have also heard that figure, Senator. I can't personally speak to it. Can you, Dr. Hirsch?

Dr. HIRSCH. I believe that is approximately correct, Senator; yes.

Senator STEVENS. And we have had the system, as we know from the history of tanker operations in the past, they used to discharge their ballast at sea, and we do not allow that in this country any more, and

the consequence of the regulation is that the ballast is taken off of a tanker and put into some sort of a purification plant at the dock, and what is discharged from the purification plant still has somewhere in the vicinity of 10 parts per million.

Have your people done any studies as to whether this is a permissible level of pollution?

Dr. HIRSCH. Well, I believe the question of whether or not it is a permissible level would depend to some extent on the characteristics of the receiving water that the pollution is going into, the degree of the pollution and the nature of the organisms located there, and so on.

What we have——

Senator STEVENS. What are you doing in San Francisco, for instance? There are a tremendous number of tankers in San Francisco and San Pedro, and up in Portland, Me. I am told there are 890 foreign tankers a year that pull into Portland, Me., to discharge oil to go through the Canadian pipeline that goes through Maine up to the Canadian east coast.

All of those tankers that are complying with our law are going through some procedure like this and Portland, Me., is receiving a substantial amount of discharge from those who are complying with the law. We know there are some that don't comply with the law, and go out and clean them out on the high seas on the way back.

Now, have we any studies to see what the effect of that discharge is on Portland, Me., or San Pedro, or San Francisco?

Dr. HIRSCH. We have studies that I think Dr. Royce might be able to describe in some detail as to what the effect of oil on various types of marine organisms is. When you come to an individual area such as the ones that you are describing, we have, insofar as I know, no significant studies underway with the exception of some monitoring type of work in Prince William Sound that I mentioned yesterday.

Senator STEVENS. That is my interest. We are studying the probable effects of our pipeline and we are not studying the actual effects of what is going on in the transportation of oil that far exceeds the total of the pipeline. That is why I am here this morning.

I would sort of like to know what we are doing elsewhere. We are fearing what might happen in Prince William Sound, but what has happened in Portland, Maine?

Dr. HIRSCH. I would add one further point, and I can't speak for the other agencies concerned, but under the Federal Water Pollution Control Act, if there are regulations established both on nonoil that can be discharged, and there are water quality standards which govern the protection of the receiving water, and that is a program jointly administered by EPA and the States, so that in a place like Maine, let's say, I can only assume, and it is an assumption on my part, that under the pollution control efforts of the State of Maine and the Environmental Protection Agency, that if the cumulative amount of oil that was going in were to exceed those standards, that action would be taken.

As I say, that is an assumption on my part.

Senator STEVENS. I am very interested in this, because we are going to face the question before the whole Senate in another week or 10 days, and I constantly hear the charge that the 10 parts per million maximum for oil in the facility coming out of the water purification facilities exceeds the level that that ecosystem can support.

Now, that is an area that has got the tidal fluctuations of about 30 feet a day.

I would think we would have looked at Portland, Maine, or San Pedro. I know San Pedro well, and they have about a 6-foot tide. I would like to know what is the discharge in San Pedro, what does it measure as they go through their antipollution procedures there, and in Portland, Maine, and in San Francisco; I know where those docks are. What level is permissible there, and how long has it been going on, and what damage has occurred?

I think that there would be a great contribution from studies like that. I support what you are doing to establish baselines in Alaska. I think that is absolutely required. But I wish they would do it somewhere else, too. That is my point, and I don't—I think we have turned our back on Portland, Maine, and on San Pedro, and on San Francisco as far as water pollution is concerned in comparison to what we have done in Alaska where the pumping hasn't even started.

It is a very, very interesting thing to see that you have got 80 percent of your money going into New York and 15 percent into Alaska, and 5 percent into the rest of the country as far as research in this area, as I understand your figures and if they are correct.

Dr. HIRSCH. That is certainly correct with respect to their one program you are describing, the marine ecosystems analysis program.

Senator HOLLINGS. I know you haven't got Dr. Royce's statement, and you know how these schedules are Doctor, they put us all around, and we are always supposed to be three other places. But with respect to the oil pollution and dumping those globules of tar and other things that you demonstrated yesterday, what is the effect, let's say, on marine life? You did the Atlantic coast off the coast of South Carolina there.

We put in our experimental food processing, bringing it down from Suitland, Md. We have some other research projects relative to the marine life.

What do you find, and what would be the threat of increased oil tanker operations in those offshore waters?

Dr. ROYCE. Mr. Chairman, I think the best answer to that question is simply, we don't know. It is an extremely complicated problem, and in the latter part of my testimony, I had in mind giving some examples. Would you like me comment at some length on this now?

Senator HOLLINGS. Yes; if you don't mind. I would like to hear just exactly what is the effect, what we do know. If we don't know conclusively, you were demonstrating yesterday some of the knowledge already gathered.

Senator STEVENS. His statement is only six pages long.

Senator HOLLINGS. Let him go ahead.

Dr. ROYCE. Mr. Chairman, the thrust of my comments concern the state of our knowledge, because we are getting into very complicated problems, and it seems to me that we should try to identify what we know, and what we don't know.

Senator HOLLINGS. The chairman has suggested that you go ahead with your entire statement.

Dr. ROYCE. I will be glad to.

I appreciate the opportunity to testify today on the effects of pollution on marine animals. In view of the limited time available, and the complexity of the topic, I propose to comment principally on the state of our knowledge on this subject.

Our fishermen were among the first to feel directly the effects of pollution. They have seen oyster and clam resources become contaminated with human wastes so they can no longer be marketed. They have seen spawning and nursery areas essential for salmon blocked by power projects or fouled by pollution. They have seen fish killed in massive numbers by waters whose oxygen has been spent in the biological degradation of the pollutants. They have been unable to market some of their catches because of the presence of heavy metals, such as mercury.

All fishery agencies, both State and Federal, in the United States have been involved for many years in evaluating the effects of pollution on fish and trying to mitigate it. The National Marine Fisheries Service conducts research on the effects of pollution at many of its field stations.

I would like to comment briefly on the status of our knowledge with respect to the effects of pollution and then give a few examples of what we do know and what we do not know about this vitally important matter.

The particular example I have in mind is the complex problem we have in oil.

I will divide the discussion into three general kinds of problems we face in understanding the effects of pollution.

The first step is to determine the lethal levels of pollutants. This means determining the concentration and time of exposure that result in death of a proportion of the test animals.

This is easy to do, and we have considerable data on the tolerance of many species of fish and wildlife to hundreds of different chemical compounds. For example, we know the tolerance of rainbow trout to low oxygen levels, to temperature levels, to concentrations of chlorine, mercury, DDT, et cetera.

Work in this category continues in the National Marine Fisheries Service with such studies as the effects of heavy metals and pesticides on eggs and larvae of shellfish and single-cell algae, the effects of oil on fish, such as young herring and pink salmon, the effects of silt on young fish and effects of thermal effluents from powerplants on fish and plankton.

The second step in understanding the effects of pollution is to determine the long-term nonlethal effects. This usually involves laboratory studies of the physiology or behavior of animals which are exposed to sublethal concentrations of a pollutant over an extended period.

We try to find out where the substance is stored in the body, how the body excretes it, whether physiological functions such as respiration, osmoregulation, excretion, and reproduction are impaired and what diseases or tissue damage may be associated with the exposure. Such studies are far more sophisticated than those for determining lethal levels and they are being done in many laboratories around the country.

In the Fisheries Service, such studies includes the effect of salinity, temperature, and heavy metals on the osmoregulation and respiration of the blue crab, the effects of DDT on the reproduction of the anchovy, et cetera.

The third, and still more complex, step in understanding the effects of pollution is to know the effect of pollutants on the whole ecosystem,

which includes the environment and all animals in it. This is far more complicated than the second step because it requires still more sophisticated techniques and large-scale experimentation in the field where conditions cannot be controlled as they are in the laboratory. Such studies are beginning in many parts of the country, but progress to date has been limited.

The Fisheries Service is undertaking studies such as the movement of manganese, iron, and zinc in an estuarine ecosystem and energy relations in estuarine ecosystems. These studies are especially important because every pollutant is certain to have some effect, either adverse or beneficial, on an ecosystem. Most effects are trivial but some are not, and being certain is most difficult.

Let me cite oil as an example of the state of our knowledge. The effects of oil pollution on the animals in the water have received a great deal of attention in recent years. Research is being done in many institutions in many countries.

The study is complicated first by the multiplicity of compounds of which oil is composed and second by the differing degradability or volatility of these compounds. Oil exposed on the surface of the water partly goes in solution, partly evaporates, and partly degrades because of the effects of the sun so that oil spilled 1 day is of a different composition the next day.

The tolerances of various aquatic animals to concentrations of certain components of the oil have been determined, we know that some of the volatile fractions which are moderately soluble in water can be toxic and that other less volatile fractions can be innocuous. This has shown up in both laboratory and field observations.

The thick crude oils are innocuous to most marine organisms. Many animals have been found with crude oil in their guts without apparent ill effects. Oysters can live for weeks in an aquarium under a layer of crude oil, if oxygen is added to the water.

The crude oil spills by the Torrey Canyon and from the wells in the Santa Barbara channel caused virtually no identifiable change in the subsurface marine organisms.

On the other hand, some of the refined oils such as diesel oil and gasoline kill animals immediately and certain fractions may be retained for long periods of time in the tissues of those that survive exposure.

Long term studies of the effects of the various oil fractions on animals are also underway in many places, but the picture is much less clear. There has been great difficulty in separating the fractions of the polluting oils from similar compounds in the fatty tissues of the animals and great difficulty in controlling experiments because of the unstable characteristics of the various oil fractions.

An interesting example of such effects is the recent discovery by one of the Fisheries Service laboratories—this is the Auke Bay Laboratory, that one species of crab, and this is the snow crab—tended to shed their legs in the presence of oil and survived for a time without legs. Other species of crabs are not so affected at the same concentrations.

As for the long term effects of oil on the entire ecosystem, we know very little. We know that we must expect changes but we do not know the conditions under which those changes will be trivial or significant.

Perhaps I might add a brief comment relative to monitoring, such

as you have suggested. It is my personal view as a scientist that this is the best way to understand the complex effects of a pollutant to follow what is happening where the pollution is already going on and where we are not controlling it.

Senator HOLLINGS. Dr. Royce, that is the survivability of the marine life. I am talking of the survivability of the human. That is what we are looking at. In other words, if you have globules of tar inside an oyster, you might as well not serve it to me.

I am not interested in whether it is going to live or not live. I know it is indible. The oyster may stay on the bottom and have no marked effect in its marine survivability; but if I have to pull it out and go through a layer of oil and give you a greasy oyster, you don't want the oyster. There again we are trying to look at this not just from the survivability of the marine life, but us.

There you go. I go with Dr. Hargis up to the Virginia Marine Institute, and there is no oyster gathering. Senator Stevens is getting into what has been the effect up in Portland, Maine. Technically, you might continue to study and spend 20 years of study, but I think what we are going to have to do in NOAA is come up with some real answers. I know the Virginia oyster gatherers are down in South Carolina now, because theirs are polluted and ours are not.

What I am asking is how do we prevent pollution? Obviously if I diminish any kind of refinery activity or oil carriage or the tanker activity in the waters offshore, seemingly, to me, it is reasonable to conclude that that would keep us from being polluted.

Is that right or wrong, or do we have to have a 10-year study to find that out, and the oysters all go? You wouldn't take a crab if it didn't have legs.

Dr. ROYCE. I sure wouldn't.

Senator HOLLINGS. That is what people along the coast in America want to know.

Senator STEVENS. How much of the concentration brought about that change in the snow crab?

Dr. ROYCE. The concentration of the soluble fraction was estimated to be about one part per million actually in solution. This was a test of the Prudhoe Bay crude oil.

Senator STEVENS. It was crude?

Dr. ROYCE. It was crude, yes.

Senator STEVENS. It is a very interesting statement you made about the effect of crude oil, because we are going away from crude oil transport and are bringing in refined products. Basically the bulk of our imports are refined products, because the refineries went off-shore, and as I understand it, we are going in a dangerous direction.

Senator HOLLINGS. Right. The danger is enhanced, is that right?

Dr. ROYCE. The spillage of refined oil is more dangerous than the spillage of crude oil now insofar as the subsurface animals are concerned.

The crude makes a terrible mess on the shore and kills the birds.

Senator STEVENS. I was raised at Manhattan Beach, and I served as lifeguard there. I remember when those tankers used to come in and clean out their ballast how mad we got.

Dr. ROYCE. You had tar on your feet.

Senator STEVENS. Yes. I would rather have the tar on my feet than have it in those fish that we used to fish for off the pier, and I think that

it is time that we started talking a little bit about this, the problem of refined products. Have you got any studies that are printed on this that carry the conclusions that you have outlined here?

Dr. ROYCE. We have studies underway, and, yes, I think we do.

Senator STEVENS. Are there studies available to us? We are trying like mad to bring some of these refineries back onshore. We have to double interest here as a practical matter. The cost of the refined products is more if they are shipped than if they are refined here, too.

I would be very interested in seeing some of these studies if any of them have been either finally prepared or printed for distribution, because I think you may make a significant contribution in an area that you don't intend to make, and that is to stop some of these refineries from going offshore.

Dr. ROYCE. Let me look into the literature and supply the committee with a list of copies and references.

Senator STEVENS. I asked your colleagues about the state-of-the-art as far as removing petroleum from any kind of waste water, whether it is ballast, or storm-drain water, or whatever system we are using.

Am I correct that the state-of-the-art is that the level of control is somewhere between 2 and 10 parts per million? In the plants we have for purification?

Dr. ROYCE. I am just not an expert on that field, Senator. I don't know.

Senator STEVENS. Who would we go to for that information?

Dr. HIRSH. Well, I believe you can go to people in the EPA. I do know you have Professor Pearson on your list of witnesses this morning, and I don't want to be placing the onus on him, but he may be more expert in this area.

Senator STEVENS. We are belaboring it, perhaps, but I think perhaps Senator Hollings and I both have great interest in the fishery resources, and we want to pursue this to the greatest extent possible.

I am obviously concerned about the future of our fisheries resources in Alaska in terms of the operation of the transportation system that we will have to move the oil up there. I can assure you—and I am sure you have seen them, Dr. Royce—that there are natural oil seeps in the area where the fish runs come through, and they have come through from time immemorial. I take it, through the same natural oil seeps and there don't seem to be any ill effects as far as that is concerned.

Have you made any studies of that, such as around the Yakutat area, where we have the natural oil seep there?

Dr. ROYCE. I am not aware of any special study of these areas.

Senator STEVENS. Has there been any study of a marine system where there has been a natural oil seep and what effect it has on the system?

Dr. ROYCE. I was going to report one interesting observation made by one of our ships in the Caribbean which was that it made rather large catches of shrimp along with a substantial amount of debris from oil seeps, and this was in very deep water.

This was not a coastal source of oil. We have been trying to follow up on that with further observations to determine the kinds of animals that live in the vicinity of these oil seeps in the Caribbean area.

This is in progress.

Senator STEVENS. Did you want to say something, Dr. Gross?

Dr. GROSS. If I might respond to your question about studies on natural oil seeps, I have been informed that the Petroleum Institute has

funded studies on the California coast by the University of California. I am not personally aware of the results.

Senator STEVENS. Thank you very much. I think it would be very important to see what the results will be. We are, again, in a strange position of looking ahead to a 50-percent level; if we continue as presently predicted, we are going to be importing 50 percent of our liquid energy resources.

Now if your conclusions are correct, perhaps we ought to start putting on, or putting back on, an oil import program on refined products, and force them to come in here in a crude oil form, because the implications of what you say are that the dangers would be less to our shores if that were the case.

I would like to see that documented, because I think we could very well do that. It would be a substantial contribution.

Dr. HIRSH. Senator, if I could comment on that, I believe the Council on Environmental Quality is just now completing a study of the potential impact of superports in the United States, and I believe among the other issues or among the issues they are looking at is the total environmental impact of the refineries that have been associated with these reports.

I believe that study is approaching completion and may be helpful with respect to some of the questions you are asking.

Senator STEVENS. I think within that problem is the question of whether the oil that is discharged at the superports has been refined or partially refined in its country of origin.

That is the tendency of the Middle Eastern countries, to require refineries there, and we have an increasing tendency to have them in the Bahamas, or Guam or Newfoundland, or Puerto Rico, and we are bringing to our shores refined products.

It has been associated with the cost of operation of refineries, and it has had a lot to do with the pricing system, and I know the people in the American labor movement are very disturbed about it, because this in effect exports jobs.

If the conclusions that Dr. Royce has announced here today can be substantiated, I think some of us that did not like that for other reasons might well have a better reason to object to the importation of refined products.

Now that may not be you gentlemen's objective for being here today, but I do think it is a substantial contribution to an argument that is going on around here in Washington, and it is reaching its height right now in terms of what is the future of the oil import program, and what are the permissible levels of imports, and what type of importation is going to be required.

I think again I would like to note this. Did you ask for additional funds for other studies? I just happened to be on the subcommittee of the Appropriations Committee that handles that, too, and this isn't an appropriations committee, I know, but I would like to see some of these studies going on somewhere else.

I want to encourage you, and I want to ask you specifically whether you need any more money for Alaska, too.

But why aren't we studying Portland, Maine? Certainly Maine has a tremendous fishery resource. It has been going on for years. Those are foreign tankers that have no real safety values as far as

our value standards are concerned. It would seem to be a great place to be studying what are the effects of what is going on in the petroleum transportation field.

Why has nothing been done in Maine?

Dr. ROYCE. I can't answer that, Senator.

Senator STEVENS. Do you have a laboratory in Maine?

Dr. ROYCE. We have had a laboratory at Booth Bay Harbor, which we have been forced to close.

Senator STEVENS. When was that?

Dr. ROYCE. In the last few months.

Senator STEVENS. It is being closed?

Dr. ROYCE. It is being closed; yes, sir. We transferred several of the studies from Booth Bay to Woods Hole, Mass., and we are closing the laboratory at Booth Bay and turning over some of the functions to the State of Maine.

Senator STEVENS. Would you provide us with a copy of your request for your operating level before it was cut by OMB? This may be getting you in trouble unless I specifically ask for that. I know we are entitled to it. What was the operating level request for funds in this area for the fiscal year 1974?

I am certain that that doesn't come within the area of executive privilege, so we will battle that out with OMB if they won't let you do it.

Dr. ROYCE. That would be with respect to funds for pollution studies?

Senator STEVENS. For the type of operations we are talking about. What was the level of operations you sought at the NOAA level?

I would like to know if you have done any studies as to where you would like to institute studies?

What about South Carolina? What about the Texas Gulf? If there is any place where we have had offshore production of oil for a sustained period with a tremendous fishery, it is the Texas Gulf, and certainly there ought to have been some studies going on down there.

Dr. HIRSH. If I can respond to that in two ways, Senator, there are some studies going on in the Texas Gulf with respect to the effects of offshore oil production. Those are being headed up by the Gulf University Research Corp. I believe they are being funded by some sort of consortium of the oil industry down there.

Senator STEVENS. Is there some way we could have a bibliography prepared of the reports that have been presented anywhere to date? Louisiana, for instance, has a fantastic fishery and has had offshore oil operations.

I think we ought to start looking over this field as to what has been done and to give you some help to make sure you have the funds and the facilities to do what has to be done if we are going to double every 5 years the number of tankers coming into this country.

No matter what we do, they talk about the tankers from Alaska. They are a drop in the bucket to what is going to happen nationally. We are talking about 2 million barrels a day from Alaska, and we are talking about somewhere near 40 to 50 million barrels a day nationally.

Dr. HIRSH. Senator, you may, I am sure recall that we are required to report to the Congress annually under the 1972 legislation on this

whole area, the effects of man on the oceans, and we were intending and we are working toward our first report, which is due next January, and one of the things we did and can present to you is a whole review of what has been done and what is going on and what is the state of our work generally today.

Senator STEVENS. I don't want to add to your difficulties, but some of these decisions we are going to face before then, and we have to make the superport decisions this year, we have to make the Alaska transportation system decision this year, we have to make the oil import decisions this year, and we won't be fixed in concrete on any one of them, I don't think, but at least they have to be faced up to.

I want to ask you one last question, and that is about the problem of these marauding fishnets that I mentioned yesterday. I understand that one of you indicated that you think the Open Ocean Dumping Convention—is that from the State Department?

I may have asked the question prematurely, then because I understand some witness today is prepared to talk about the effect of the convention on those fishing nets.

Are you familiar with those, Doctor?

Dr. ROYCE. No, I am not.

Senator STEVENS. Well, we certainly appreciate your contributions, gentlemen, and I am sorry that I have detained you so long. Thank you very much.

Dr. GROSS. Thank you very much.

Senator STEVENS. Mr. Salmon?

Good morning, gentlemen. Would you identify the people who are with you, please Mr. Salmon?

STATEMENT OF WILLIAM C. SALMON, DEPUTY DIRECTOR, OFFICE OF ENVIRONMENTAL AFFAIRS, DEPARTMENT OF STATE; ACCOMPANIED BY RICHARD K. BANK, ACTING DIRECTOR, OFFICE OF MARITIME AFFAIRS; AND TERRY L. LEITZELL, ATTORNEY-ADVISED, OCEAN AFFAIRS

Mr. SALMON. Yes, Senator. With me is Mr. Terry Leitzell, attorney-adviser, Ocean Affairs, Office of the Legal Adviser; and Mr. Richard Bank, Acting Director, Office of Maritime Affairs in the Department of State.

My name is William C. Salmon, Deputy Director, Office of Environmental Affairs, Department of State.

Senator STEVENS. With a name like that, you are in a good place in fisheries.

Off the record.

[Discussion off the record.]

Senator STEVENS. Would you like to put your whole statement in the record, or do you want to read it?

Mr. SALMON. Either one, sir.

Senator STEVENS. It would be helpful to the committee if you could summarize your statement and put the whole statement in the record. We have other witnesses, and I have sort of delayed the proceedings already.

Mr. SALMON. I will be glad to, sir. I have reviewed the activities the Department is engaged in and have characterized these responsibilities as three general areas: One, the management of U.S. participation in several intergovernmental organizations active to some degree in marine pollution control; two, the management of U.S. participation in the negotiations of international agreements or treaties designed to curb marine pollution; and three, the direction of U.S. Government Federal agencies' cooperation with counterpart agencies in other governments under various bilateral agreements.

The Stockholm Conference last year developed more than 100 recommendations, and I am making available to the committee this morning a copy of those recommendations which emanated from that conference.

I would like to make particular note of the keystone action at the Stockholm Conference: The U.N. Fund on the Environment which the United States proposed a year ago and which was adopted and approved at Stockholm by the General Assembly last winter.

We have to date 96 percent promised or indicated participation in this \$100 million fund for the first 5 years. Part of that, up to 40 percent, would come from the United States. Legislation and appropriation requests are pending with the Congress now on that matter.

The action arm of the United Nation in the environmental field is known as the environmental program. The Secretariat reports to a policy group composed of a 58-nation environmental governing council.

I mention in my testimony a number of activities of the specialized agencies of the United Nations. I think most important for this committee's consideration at this time is the work of IMCO and a number of conventions that they have worked on, the implementing legislation of which is under review of this committee.

I particularly wanted to mention, with regard to the Stockholm Conference, that an ocean dumping provision was developed during its preparatory phase. This was concluded after the Stockholm Conference at a meeting in London from October 30 to November 13. We will be talking to you next week, sir, on the Ocean Dumping Convention, although we will go into more detail at this time if that is desired.

I think it would be appropriate to specifically mention our cooperation with other countries.

Of greatest interest in the recent past has been our cooperation with the Soviet Union. This agreement was signed in May 1972, and the work in the marine pollution area was one of 11 projects which were part of that package at that time known as the Cooperative Agreement on Environmental Cooperation.

The marine pollution area has since been divided into three topics. These deal with marine pollution in shipping, pollution from oil and gas production and drilling, and the effects of pollution on marine life.

Meetings of these working groups have been taking place in the United States during May of this year, and we look forward to this work continuing largely on a basis of exchange of information and visiting scientists. Hopefully we will be able to identify some cooperative projects which will be of benefit to both countries.

The work we are doing with Canada is of particular importance to our own waters. We make note of our work on the joint United States-Canada oil and hazardous materials contingency plans for the Great Lakes. This was made part of our Great Lakes agreement, the water quality agreement, signed between the two heads of state in April of 1972.

We have continued our work with Canada in this area to develop plans for coping with problems on the Atlantic and Pacific coasts as well.

I would be happy to answer any questions you have.

Senator STEVENS. What is the attitude of the other nations who are working with us in regard to this total concept of ocean pollution?

Mr. SALMON. I believe, sir, that it is fair to say that almost every nation that we have worked with is very much concerned about marine pollution. Many coastal states see pollution from their own perspective, standing on their own shores.

We all have the problems of tar on our feet and problems concerning the economic harvest of the seas being questioned in light of public health.

I believe that more and more countries are becoming concerned about the long-term effects of pollution, wanting to know what effect it will have on the ecosystems of the ocean and of the globe in its entirety.

Senator STEVENS. Do you have any statistics as to the age of the world's tanker fleet?

Mr. SALMON. We have none with us this morning, sir. We could supply them, if this is desired.

Senator STEVENS. I think it would be very interesting to have that in the record.

[The following information was subsequently received for the record:]

TABLE XVib.—AGE DISTRIBUTION OF TANKER FLEET AS AT MID-1972

[Ships of 100 g.r.t. and over]

Country	Percent of total tonnage						Total tonnage (thousand g.r.t.)
	Under 5 years	5 to 10 years	10 to 15 years	15 to 20 years	20 to 25 years	25 years and over	
Australia.....	40	8	30	12	10	-----	250.1
Belgium.....	4	36	55	5	-----	-----	326.6
Canada ¹	41	16	10	9	15	9	175.8
Denmark.....	51	38	9	2	-----	0	1,888.4
Finland.....	40	3	18	21	16	2	761.9
France.....	51	21	16	11	1	0	4,232.0
Germany (Federal Republic of).....	53	28	10	4	5	0	1,882.2
Greece.....	30	19	22	20	7	2	5,205.1
Italy.....	34	19	23	16	4	4	3,119.4
Japan.....	56	32	10	2	0	0	12,717.2
Netherlands.....	24	23	33	18	0	2	1,934.2
Norway.....	39	45	11	5	0	0	10,680.7
Portugal.....	18	26	28	14	14	0	266.8
Spain.....	59	16	15	6	1	3	1,885.5
Sweden.....	51	33	14	2	-----	0	2,020.2
United Kingdom.....	55	16	20	7	1	1	13,671.3
United States ²	18	6	24	17	5	30	4,543.9
Percent OECD countries ³	45	26	16	8	2	3	65,561.3
Argentina.....	1	10	20	19	24	26	496.7
Bermuda.....	45	41	5	9	-----	0	598.1
Brazil.....	32	13	48	0	6	1	575.9
China (C.P.R.).....	15	3	39	20	10	13	209.5
Cyprus.....	-----	-----	27	45	28	0	224.0
India.....	38	42	3	7	10	0	287.6
Kuwait.....	76	17	7	-----	-----	-----	423.7
Liberia.....	41	19	18	18	3	1	25,500.9
Mexico.....	39	33	6	21	1	0	217.8
Panama.....	23	11	30	15	12	9	3,979.4
South Korea.....	54	1	6	24	15	-----	401.1
Taiwan.....	78	-----	5	5	8	4	341.3
U.S.S.R.....	21	47	19	12	0	1	3,660.2
Venezuela.....	-----	-----	80	14	3	3	257.8
Yugoslavia.....	48	21	12	19	0	0	250.7
Rest of world.....	11	16	34	19	13	7	2,027.1
Percent world total.....	41	24	18	11	3	3	105,013.1

¹ Excluding tankers of the Great Lakes.² Excluding tankers of the Great Lakes, including reserve fleet.³ Excluding Iceland, Ireland and Turkey, for which figures are not published by Lloyd's.

Source: Lloyd's Register of Shipping.

Senator STEVENS. Am I incorrect in assuming that one of the major focuses of international conferences to date is vessel pollution activities?

Mr. SALMON. Yes, sir. I think that is fair to say. The work of IMCO, the Intergovernmental Maritime Consultative Organization, has been very active in this area. It started out as a specialized agency of the United Nations concerned with safety at sea, and has expanded its views to encompass the interests of those who use the seas for other purposes.

A number of the treaties that have been developed in the recent past are designed specifically to cope with pollution from shipping activity.

I think our 1973 IMCO Convention on which we have been spending a fair amount of time, will be another step toward effective control of this source of solution.

Senator STEVENS. Who controls IMCO? Do the shipping nations of the world control it?

Mr. BANK. Senator, IMCO has 77 member states now. Of course, membership is open to all U.N. members, and nonmembers as well, who become signatories.

IMCO is broken down into various committees and subcommittees. With specific regard to marine pollution, the United States has made a proposal at the last IMCO Council, which ended on June 8 of this year, proposing the creation of a Marine Environment Protection Committee which would help facilitate the operation of the various marine pollution conventions. That committee is envisioned to be open ended, and all members of IMCO, plus all signatories of the new IMCO Convention dealing with this area would have a say in amending procedures and in the supervision of operations in this field.

Senator STEVENS. Have you people worked with Mr. Train on his new proposal for the marine environmental pollution committee? As I understand it, it would be a subcommittee of IMCO?

Mr. BANK. Yes, sir. I was with Chairman Train in London last week.

Senator STEVENS. What has been the acceptance of that concept with respect to proceeding with some group? I think he said it would act as a permanent watchdog against ocean pollution.

Mr. BANK. The reaction was overwhelmingly positive within the IMCO council, which has 18 members. We received support for not only the principle of a permanent committee for IMCO, but for the United States' specific proposals on the meeting to set up this committee.

There will be a further session later on this summer which will set forth the terms of reference for the committee. The committee will report informally to the October marine pollution conference, and have its report prepared for the next extraordinary session of the council of IMCO, which is to take place in the 2nd week of November of this year.

At this point, the assembly, the governing body of IMCO, will approve the committee which will be functioning, hopefully by the end of this calendar year.

Our support from the council ranged from Poland, which was the first country to come out strongly in favor of our proposal, through the traditional maritime countries, as well as the less developed countries and the coastal states such as India, and one of the coastal states most interested in pollution, Australia.

Senator STEVENS. Has the discussion of the age of the world tanker fleet been raised at IMCO, to your knowledge?

Mr. BANK. Yes, sir, it was. It is raised more in the technical area of IMCO. As you are aware, Senator, the technical aspects of IMCO, both in safety of life at sea as well as in pollution are handled to a great extent by our Coast Guard experts. In this regard, the age of the tanker fleet plus the basic pollution and safety factors which are associated with aging ships and ships in general are discussed. They represent a major portion of the discussions in IMCO technical bodies.

Senator STEVENS. I have an impression these aging vessels are never retired, but are just passed on to someone else. If we were to do the same thing with other forms of transportation, air freight, automobile truck or, rail, we never would obtain the level of safety that exists in the world in the other forms of transportation.

Is this wrong? Is there any entity in the world that is going toward absolutely retiring any of these ancient vessels?

Mr. BANK. I think through the IMCO safety and pollution requirements, that the end result will be reached. We find the retirement of the vessels, and their nonuse, is an economic matter. There are two

great economic factors in the operation of vessels. One is the insurance that can be obtained for these vessels, and the other is whether these vessels are permitted in the ports which they would like to serve.

Through the IMCO conventions, and through regulations set down for pollution control, vessels not being certified will not be able to call at ports of signatory states, and when the older vessels are inspected and found not to contain certain safety and pollution controls, they will not be allowed to call, and you will find a decrease in their presence on the high seas.

Senator STEVENS. Is that true, or are they just going to go into the back waters of the world, and are we going to export our liabilities to the emerging nations?

Mr. BANK. We are doing all we can to have the emerging nations join with the more traditional maritime states to become parties to the IMCO safety and pollution standards.

I cannot say, Senator, that they will not find their way into the back waters of the world, but as the world becomes more aware of pollution problems and more of the developing states recognize that it is their problem as well as our problem, they will become parties to IMCO conventions, and the presence of these vessels on the high seas will diminish.

Senator STEVENS. The Florida Supreme Court decision upholding the tough law with regard to pollution, has that been raised in your dialog at all?

Mr. SALMON. Not that we know of, sir, not in the international forums.

Mr. BANK. If I may say, Senator, we do get some questioning of it, naturally, on an informal basis. There still is a desire to wait and see how the Florida regulations, which I believe will be issued within the next week or two, will have an effect.

Senator STEVENS. You mentioned the law of the sea conference, and Senator Hollings and I are going to visit that. Are you satisfied with the preliminary draft work that has been done to try to assert through the law of the sea conference these new standards for vessel pollution?

Mr. SALMON. If I may turn to Mr. Leitzell for a more complete answer; as I stated in my testimony, we need to spend a great deal more time on marine pollution. I think the approach of IMCO is designed to cope with the issue raised.

Mr. LEITZELL. I might just add, Senator, that there has been, over the past 6 months, a greater degree of coordination within the U.S. Government between our activities in IMCO and in the law of the sea negotiations, because we are beginning to realize interrelationships, especially those on the questions of standards for vessel pollution control.

For instance, we have two members of the law of the sea task force on the delegation to the IMCO council. Several of us are working with the IMCO task group which is preparing the U.S. position to the October conference. We will have people who have been directly involved in IMCO work on our delegation to the Seabed Committee this summer, and several of the Seabed Committee members on the October conference delegation.

I think that this coordination is beginning to pay off, at least within the U.S. Government, through actions such as Judge Train's proposal at the IMCO council and the work in the law of the sea negotiations, toward trying to achieve agreement on the concept of international standards for vessel pollution and control.

Also, I think we have begun to make headway internationally in convincing some of the major maritime states of the necessity of recognizing the desires of many other states for more effective controls on vessels. Hopefully that recognition will also improve their work in IMCO.

Senator STEVENS. Are you the gentleman to whom I should direct the question about the problem of our nets that are being dumped up in Alaska? That has been raised with you? I know I have been screaming all over this town about that. Has Japan taken any action to provide for implementation of the convention?

Mr. LEITZELL. Not that I know of to date. They did sign the convention, but I don't know what they have done to ratify the convention and become a party to it. The dumping overboard of nets, especially those made from synthetic materials, is one of the outright prohibitions. That is provided for in the convention.

Senator STEVENS. That is like, if you will pardon me for being facetious, like a law against people spitting out of car windows. They do it, and you don't know who did it.

I have over at my office now a couple of boxes of pieces of nets and gear that are all plastic, that have been picked up by Alaska fishermen from the end of the Aleutian chain down to Ketchikan, the whole rim of the Gulf of Alaska.

There is no identification on them, except that we know they are the type of gear that Americans can't use, and we are getting highly alarmed about the increasing use of these by foreign nations, or by these vessels of the foreign nations, of equipment that we ban from our waters.

I have suggested that we try to get some way to have these nets and gear—the fishing gear—marked, some international identification system, so that we could have enforcement of these conventions and the implementing legislation.

Right now, there is no way to enforce it against these vessels unless we catch them in the act, as we did those Japanese vessels—I think by accident, really—a few weeks ago.

But even then, now that we have caught them, I understand there is no violation of Japanese law about what they did. There was a violation of our law in the sense that they were within our waters fishing. We will have them—and Japan will prosecute those vessels for that. But to my knowledge, they violated no law by dumping 14 nets that were monofilament nets, some of them 14 miles long, and if we hadn't apprehended them—we got two CG vessels up there to get them back—and it took about 6 days to recover those nets.

We were lucky; we recovered all of them. Those are just the ones we found. Those are the people we saw. I think this is probably the worst form of pollution in the North Pacific today, the plastic, or monofilament type fishing gear that is being jettisoned from those foreign vessels.

Mr. SALMON. Senator, this experience you relate is similar to that which was discussed and served as the purpose and basis for the item in annex 1 of the convention that Mr. Leitzell referred to.

The operation of the convention indicates that the Government of Japan, or any other government, should institute domestic legislation to require that nets not be dumped under any conditions, except in an emergency, and it is my current knowledge that the Japanese domestic legislation on ocean dumping does not include this specific item.

However, it is my understanding that they intend to ratify the convention. They have a couple of other problems that the convention presents and that they must undertake before implementing domestic legislation to control such disposal.

Senator STEVENS. Pardon me. I don't know if you know it, but the chairman, and Senator Kennedy, and I, and several other Senators will be introducing legislation today to take unilateral action to extend the jurisdiction of the United States out beyond the 12-mile limit.

I think many of us are getting weary of waiting for the international community to set up any form of policing of these areas that are offshore—off our shores in particular—and periodically, I inform the Senate the number of foreign vessels off the coast of Alaska. I think sometimes that I ought to put all these people who are going to go to the law of the sea conference on a plane and take you up there, right about now, and let you see one of the vessels.

I will show you one that has a 14-story apartment building in the bow—not in the stern, but in the bow. They have so much gear in the stern, that they put the people up front. Their smallest vessel is larger than the largest American vessel in the West Coast fleet.

You have no comprehension of what is up there unless you go see it. You can talk all you want about the East Coast vessel operations. Those are comparatively small. The West Coast are smaller in number, but you ought to see the size of them. I am going to suggest that to the Secretary, that before you people go over there, you go up and take a look at what is going on in the North Pacific. One fishing fleet took a billion pounds of one species of fish out of the North Pacific in 1 year, and at the time we are limiting the taking of ocean mammals, they are taking all the food of the ocean mammals.

There are more ocean mammals that are going to die of malnutrition than have been harvested in the past. Unless we do something about the foreign fishing, there aren't going to be any more mammals in the North Pacific after a while.

I really think that the solution lies ultimately in the law of the sea conference. If they get some teeth in these laws, then these foreign nations enforce them. But if they don't, there are some of us here who say we should follow our neighbor Canada and go a little bit further and exert unilateral jurisdiction out there and force that jurisdiction as far as antipollution activities are concerned.

I know we are not very welcome at the law of the sea conference with those attitudes, but we are really in a state of despair in the North Pacific now. We don't know what to do. The runs are disappearing, the fish runs are disappearing, their food stocks are declining, the increased pollution activities are obvious to anybody, and yet we see nothing being achieved except, with due respect to you gentlemen, more talk on the international scene.

Mr. SALMON. Senator, I think we all appreciate the situation. Some of us who have been on the East Coast—and I am not familiar with the West Coast concerns—are very much concerned about the severity of this problem. From the Department's point of view, we feel the long term success for a solution lies in international negotiation.

However, this does take a good deal of time, and can often become extremely frustrating when one is trying to reach an agreement within a reasonable period of time.

Senator STEVENS. Let me again say, not facetiously, but I would suggest that if it is at all possible for your people to go to Alaska and over the Pole, you should do it. The salmon run will be going on then, but I can put you on one of the CG patrol planes, just about 8 hours—there is plenty of room on them—and take you out and let you see what we are talking about, because I do not think you realize you are talking about things that are the size of some of those buildings you see right near the U.N., and that these people are living out there year round.

They are not going back and forth like our vessels are, back and forth to shore and bringing the catch back to shore. They are shipping the stuff back after the factory ships pack it. They are going back on freighters.

They have permanent colonies in the North Pacific right off our shores, and we are not doing a damn thing about it, and it really is quite disturbing.

I am very serious. I am going to make that suggestion to the Secretary, as I said, but I hope some of you would see some personal advantage in taking the trip anyway.

Mr. SALMON. I would like that.

Senator STEVENS. Wetting a line along the way is always pleasant.

Mr. SALMON. I will see to it that it is promptly attended to.

Senator STEVENS. Thank you, very much. I sent for those pieces of those nets. I will be happy to show them to you if they get here. I have pieces of the latest nets that were brought in, and you cannot find a mark on them to identify it.

You ought to take some of it over to Geneva and see what people over there say about it.

Mr. SALMON. I would suggest, and this is not a considered observation at this point, that it may not be necessary to bring to the attention of another government a specific ship that was involved in such an incident if we were able to impress upon that government that they were involved, or that their people or their flagships were involved. There may well then be an opportunity to move negotiations a little faster.

Senator STEVENS. I appreciate that comment. It seems to me that we have little opportunity at the present time to impress on you people the impact of what we are doing.

The great difficulty that we have is that we have an area that has got half the coastline of the United States. There are two CG vessels, one north of the chain and one south of the chain. There are two patrol planes, one going northeast—northwest—and one going southwest daily.

Now, only by accident do they come across the people that are violating our territorial waters, and that is the primary object of the

enforcement activities today. But that is only 12 miles from shore. These people just have to be 13 miles from shore with this kind of gear and they are legal under our current U.S. law, and yet their activities in many instances are in violation of other international agreements, such as the 175th meridian.

The Japanese agreed not to fish for salmon east of that line, and that is salmon gear. The real problem is that they are fishing on the high seas for fish that they agreed not to fish on the high seas for.

We have no way, really, to effectively enforce that if they do not enforce it themselves. In the old days, when we had some lever on them, when we were providing the Japanese substantial financial help after World War II, it did not occur, and they signed the agreements readily. Now that they are the third economic power of the world, their people are thumbing their noses at us daily, and I think that this is the thing that is going to lead to the enactment of the bill that we are going to put in today if there is not such assurance from the International Committee that they are going to prevent this activity.

I think we are going to have to prevent it and back it up with the American Navy to make certain that it is prevented. That kind of gear cannot help anything. That is monofilament salmon net. NOAA informed us that there were 24,000 plastic items estimated at 12 tons of trawl net and 7,000 gill net floats that washed up on the beaches of Amchitka Island in 1 year. That is one island in 1 year, and you have to understand the volume of fishing.

I belabor it. We will be happy to see you in Geneva, and keep you out of the way of the Japanese, unless we want to start World War III. We are about to start it.

We have the greatest protein resources in the world left in the North Pacific, the only really manageable fishery left. It can be preserved if we can keep pollution out of it. That is why I am happy to have my colleagues and good friends in NOAA interested in this.

So, I am grateful to you, and I am sure the committee is grateful to you for your contribution, and I hope to see you in Alaska about the second or third week of July. When are you going?

Mr. SALMON. What specific date, sir? We would very much like to be there.

Senator STEVENS. I have several boats that are going to take friends of mine up there on the way to Geneva.

Off the record.

[Discussion off the record.]

STATEMENT OF WILLIAM C. SALMON, DEPUTY DIRECTOR, OFFICE OF ENVIRONMENTAL AFFAIRS, DEPARTMENT OF STATE

Mr. Chairman and members of the Subcommittee :

It is a pleasure to appear before you today to discuss the activities of the Department of State in the general area of marine pollution control. The Department's principal responsibilities in this area involve: (1) the management of United States' participation in several intergovernmental organizations active to some degree in marine pollution control; (2) management of United States' participation in the negotiations of international agreements or treaties designed to curb marine pollution; and (3) direction of United States Government Federal agencies' cooperation with counterpart agencies in other governments under various bilateral agreements.

The most comprehensive effort in the recent past to identify the more important elements of needed international action to deal with marine pollution were those of the United Nations Conference on the Human Environment. Meeting in Stock-

holm, Sweden between June 5 and 16, 1972, over 2,000 delegates from 113 countries discussed and agreed to 109 recommendations for international action and recommended the creation of a United Nations Environmental Secretariat, a Governing Council (which is now made up of 58 countries and is holding its first meeting this week and next week at Geneva), and the establishment of a voluntary Fund on the Environment. Several of the recommendations dealt with work in the marine pollution control area and it is the considered position of this government that a significant part of the United Nations Environment Fund should be devoted to work in the marine area.

The keystone activity from the United States' viewpoint of the United Nations Fund on the Environment is the global pollutant monitoring aspect of the program known as "Earthwatch". The oceans are a vital link in the chain of the processes of life on this earth. The level and distribution of certain pollutants and the rate of change of those levels and distributions are of particular significance. Earthwatch includes a number of activities concerned with developing data generating systems for ocean pollutants, such as GIPME, the Global Investigation of Pollution in the Marine Environment, and IGOSS, the Integrated Global Ocean Station System. I am happy to say that these programs and several others are in various stages of early initiation. It will be a future task of the United Nations Environment Secretariat to determine what programs are in need of alteration or expansion, where new initiatives are needed to ensure coverage of the most important aspects, and to what areas portions of the United Nations Fund on the Environment should be applied to meet the principal objectives of Earthwatch.

The specific recommendations for international action approved at Stockholm concerning marine pollution urged: that attention be given to GIPME and IGOSS; that the Intergovernmental Oceanographic Commission (IOC) be strengthened; that a series of statements or so called "principles" on marine pollution control be considered by the International Maritime Consultative Organization (IMCO) and by the Conference on the Law of the Sea; that governments conclude the draft Convention on Ocean Dumping participate fully in the implementation of existing conventions (such as the various IMCO conventions) and of meetings developing new conventions such as the 1973 IMCO convention and the Law of the Sea; and that a number of other efforts be made. For the Committee's use, I am making available a copy of the recommendation of the Stockholm Conference dealing with marine pollution.

During the two years of intensive preparations for the Stockholm Conference, a number of international meetings were held to develop materials for the June 1972 Conference. One of the major activities undertaken during this period was the work of an Intergovernmental Working Group on Marine Pollution which met at London during June 1971, at Ottawa during November 1971 and at Reykjavik during April 1972. This Group spent a great deal of time developing the now completed Ocean Dumping Convention and significant attention to the other recommendations on marine pollution that were considered at Stockholm. Although we started in June 1971 with the idea that a completed convention on Ocean Dumping could be made available for signature at the Stockholm Conference, the nature of these early negotiations lead us to recommend at Stockholm that final action be taken after Stockholm and, through the generous offer of the Government of the United Kingdom and Northern Ireland, to complete the text of the treaty at a meeting at London held during the period October 30 to November 13, 1972. I would sincerely like to thank the committee for making a member of its staff available as an advisor to the U.S. Delegation to the London meeting. It was and has been very helpful to us.

The text and history of the Ocean Dumping Convention has been documented for the purpose of requesting the consent of the Senate to United States ratification of the Convention.¹ At the present time, 45 countries have signed the Convention which has opened for signature on December 29, 1972 at the capitals of the four depositary governments: London, Mexico City, Moscow and Washington. Our domestic ocean dumping legislation, PL 92-532, was signed into law in October 1972 and the text of the international convention on the same matter was completed on November 13, 1972. Future hearings of this Subcommittee will address the proposed legislation which will bring our domestic legislation completely into line with the scope of the international convention. This proposed legislation, S. 1351, deals principally with extending the existing United States regulations on ocean dumping to United States flagships anywhere in the world.

¹ Executive C, Senate Document, 93rd Congress, 1st Session, Message from the President transmitting the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

One of the major international negotiating efforts underway at this time, which includes concern for marine pollution, is the preparatory work for the Conference on the Law of the Sea. Strong concern for the conservation and preservation of the marine environment was expressed at the recent session in New York of the United Nations Seabed Committee. Several draft articles were submitted and considered at this meeting and it is expected that the work in this area at the upcoming Geneva session of the Seabed Committee will be focused on further debate on these draft articles. The major thrust of the United States position at the New York meeting in March centered on international standards for vessel pollution in the areas beyond territorial seas and in straits used for international navigation. This approach was welcomed by States with maritime fleets and not welcomed by States with other interests. It was obvious that all States needed to give careful attention to this area in preparing for the summer Law of the Sea session at Geneva.

The New York meeting of the Seabed Committee did tentatively agree to two draft articles. One holds that States have the obligation to protect and preserve the marine environment in accordance with the provisions of articles yet to be developed. The other holds that States shall guard against the effect of merely transferring marine pollution damage from one marine area to another. To summarize, perhaps too simply, a good deal of international discussion and negotiation remains to be done in the Law of the Sea context on marine pollution.

Another very vital intergovernmental activity to control marine pollution is the work of IMCO which is concerned with shipping and controlling pollution from commercial shipping activities. Over the years, IMCO has moved from an organization of shipping interests to one of interests in all aspects of shipping, including the ship owner, the seaman, and the other people who also make use of and enjoy the seas.

The first major step involving IMCO toward control of marine pollution from shipping was the 1954 Convention for the Prevention of Pollution of the Sea by Oil. This Convention's principal objective was the protection of amenities from oil pollution which was adopted by proscribing certain "prohibited zones" extending to at least 50 miles from the nearest land within which the discharge of oil or oily mixture was not permitted. In 1962, amendments to the 1954 Convention extended its application to a broader range of ship sizes and extended the zones in which the discharge of oil was prohibited. In 1969, amendments limited the quantity of oil that a tanker could discharge seaward of the prohibited zones. Amendments in 1971 were adopted regarding the limitation of the size of cargo oil tanks. IMCO will convene in October of this year a conference for the purpose of preparing a more comprehensive international agreement to prevent and control pollution by ships or other equipment operating in the marine environment. The main objective of this conference will be the complete elimination of intentional oil discharge and minimizing spillage of oil and other noxious substances as a result of accidents.

The "Torrey Canyon" disaster of 1967 brought to light the need for international law regarding coastal States' rights to protect their coastline. In 1969, the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties affirmed the right of a coastal State to take certain measures on the high seas necessary to prevent, mitigate or eliminate danger to its coastline from pollution of oil, or of the threat thereof following a maritime casualty. At the present time, nine of the required fifteen States have ratified this Convention.

A second issue stemming from the Torrey Canyon incident is related to the ship or cargo owner's liability for damage suffered by States or other persons as a result of a marine casualty involving oil pollution. The 1969 Convention on Civil Liability for Oil Pollution Damage placed certain liability on the owner of the ship transporting the oil. Such liability will not exceed \$14 million. This inadequate limitation, as viewed by some, gave rise to the development of a Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, which was opened for signature in 1971. This fund was established for the compensation of victims of pollution damage inadequately dealt with under the 1969 Liability Convention and for relieving ship owners of added financial responsibility.

I would like to now direct attention to the work being done in our cooperative programs with other countries, the third item, I mentioned in the very early portion of my testimony. During the most recent months, our bilateral work with the Soviet Union has received more attention than any other bilateral cooperative program.

Marine pollution was one of the eleven subject areas enumerated in the U.S./USSR Bilateral Agreement signed in Moscow by Presidents Nixon and Podgorny on May 23, 1972. It has now been broken up into three separate projects, each with its own working group. The projects deal with marine pollution from shipping (lead Agency: Coast Guard), marine pollution from oil and gas drilling and production (lead Agency: U.S. Geological Survey), and the effects of marine pollution on marine life (lead Agency: Environmental Protection Agency). Meetings of joint U.S./Soviet working groups on all three projects took place in the United States in May 1973.

Under the project on marine pollution from shipping, the two sides will exchange information on technical means for avoiding accidental oil spills in ports and harbors and the open sea, for cleaning oil-contaminated water intankers, for washing cargo and fuel tanks on tankers and other vessels, on chemical means for the collecting dispersing and sinking of oil in the marine environment, and on laws rules, and procedures for control of marine pollution from shipping. They will also work on collection and elimination of sewage and solid wastes from vessels.

The Program of Work of the oil production working group includes methods and techniques for prevention of marine pollution during drilling and development of oil fields; collection and treatment of oil field waste waters; and prevention of pollution from oil pipelines.

The Joint Working Group on effects of pollutants on marine organisms drew-up an ambitious 20-point program of cooperative research, including such topics as effect of pollutants on stability of marine ecosystems; synergistic effects of pollutants on marine organisms; effects of toxic organics, including biocides and their degradation products, on marine organisms; global budgets of marine pollution; sources of plastic particles in the marine environment and their effects on organisms; and problems associated with ocean dumping of solid wastes.

All of these projects will get underway with exchange of published information and data will progress to exchanges of scientists and technicians for brief visits and for extended stays, to seminars and symposia, and ultimately to research projects designed and carried out according to a common plan.

The first meetings of all three working groups were considered highly successful by the United States project chairmen, who were encouraged by the seriousness and professionalism of their Russian colleagues. They expect the cooperation to provide solid practical benefits to the United States.

Of more importance to our own waters is our cooperation with Canada. The United States and Canada signed a "Joint United States-Canada Oil and Hazardous Materials Contingency Plan for the Great Lakes Region on June 10, 1971. The purpose of the plan is to provide a coordinated and integrated response to pollution incidents in the Great Lakes System by responsible federal, state/provincial, and local agencies. It supplements the national, regional and local plans of the two sides. The contingency plan is administered by the Coast Guard on the United States side. It has been incorporated into the Great Lakes Water Quality Agreement of April 15, 1972.

Negotiations have been going on with Canada for some time to conclude a comprehensive marine pollution contingency plan that would subsume the Great Lakes plan and would apply to the Atlantic and Pacific coasts as well. Negotiations have progressed well, but are now suspended while the United States side studies the implications of the draft plan for the question of territorial and maritime jurisdiction, which will be dealt with at the Law of the Sea meetings. There is no indication of when these negotiating problems might be resolved, though de facto cooperation on oil spills is already going on in Puget Sound. Prospects of greatly increased tanker traffic along both coasts over the next few years would seem to make conclusion of an agreement a matter of priority.

Mr. Chairman, I have very briefly covered a number of activities in which the Department is active concerning the subject of marine pollution control. Our success in each of these areas depends very much on the technical capabilities and participation of a number of technical agencies of our government. I believe the team work that we all have enjoyed over the past years in working on these issues has been excellent. We look forward to continuing this relationship in the future.

Thank you for your attention to my remarks and I will be pleased to answer any questions you may have on this material.

Senator STEVENS. Mr. Nierenberg.

Excuse me, Mr. Nierenberg, I do appreciate your appearance. Yours is a short statement; would you like to present it?

STATEMENT OF DR. WILLIAM A. NIERENBERG, CHAIRMAN, NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE, DIRECTOR, SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.

Dr. NIERENBERG. Yes, sir.

My remarks will be relatively brief. Before going into their substance, I will introduce them by calling your attention to a phenomenon that has somehow escaped general public notice. Twenty years ago, the total worldwide fisheries yielded something less than 20 million tons per year. Some farsighted oceanographers such as Columbus Iselin at Woods Hole or my distinguished predecessor, Roger Ravelle, at the Scripps Institution of Oceanography, valiantly called attention to the important food resources the oceans held for the peoples of the world.

In particular, they signaled the important protein resources available in the common fisheries of the world. Today, 20 years later, the annual world catch is realizing close to 80 million tons.

To put this figure in perspective, it amounts to one-eighth of a pound of fish per person per day for the entire world. We can see then that in a short period of time how fundamental a contribution the fish production of the ocean has made toward satisfying global protein requirements. Without directly remarking it we have come, as a world, to depend in an important way on this sustained yield. It is difficult to see how this could be easily replaced today.

The total sustainable yield of the oceans with current fishing technology is still not easy to fix, but the best estimates are that it is 100 million tons per year, and so we are very close to the limit of what the oceans can produce in the way of this valuable resource.

As I see it, there are three factors involved in the maintenance of this level of production. The first, and perhaps most pressingly serious, is that of overfishing in the absence of effective national regulations and international agreements on the use and conservation of the fisheries' stocks.

We can very safely predict, on the basis of past history, that the production of this vital resource will drop and drastic changes will occur in the existing fisheries.

The second danger is nature itself. We can anticipate climatological changes which will affect the basic productivity of the fisheries of the world, and judging by past history, and if we do not pursue a vigorous understanding of these factors, production will be severely affected, at least for a period of time.

The third factor is what man himself has done, and will do to the oceans as an environment. This is the subject of today's hearings and we know that man's intervention in the oceans can be such as to have a strong negative effect on the biological productivity of the oceans themselves. In view of our worldwide dependence on the oceans as a source of a basic protein food, this is a matter of considerable concern.

Just as the marine scientific community had been in the forefront in indicating the importance of the oceans as a source of protein, so has the marine scientific community assumed the responsibility to assess the quality of our coastal and open waters and to formulate a strategy through its available programs to minimize losses of resources.

These scientists have come from industry, the university, the government, and their findings are documented in readily available publications usually issued through the NAS, the NSF, or the NOAA.

For the record, I will cite four programs, three of which have resulted in publications; definitive publications, I should say, and one which will do so shortly:

1. *Marine Environmental Quality*.—Suggested Research Programs for Understanding Man's Effect on the Ocean. National Academy of Sciences Special Study, August 9–13, 1971. The assessment of possible pollutants entering the oceans and the formulation of baseline studies.

2. *Baseline Studies of Pollutants in the Marine Environment and Research Recommendations*.—Deliberations of the International Decade of Ocean Exploration Conference, May 24–26, 1972 (NSF/IDOE publication). Herein, the three collectives of pollutants, halogenated hydrocarbons, petroleum, and heavy metals are considered in seawater, marine organisms, and sediments to obtain a sense of the degree of pollution in coastal and open ocean waters.

3. *Marine Pollution Monitoring: Strategies for a National Program*.—Deliberations of a workshop held at Santa Catalina Marine Biological Laboratory, October 25–28, 1972. Sponsored by NOAA. The chapter and verse of where, how, when, and what to monitor with respect to the three pollutant classes cited above. It cites specific analytical methods, given in detail. It gives what rivers, airs, waters, organisms, and sewer outputs to assay.

4. *Prediction of Organic Pollutants (POP)*.—This is a program now underway. It is sponsored by NSF and by EPA. Its aims are described in the appended literature. I will submit this literature later.

[The following information was subsequently received for the record:]

* * * * *

The Ocean Affairs Board is initiating a study to Predict Ocean Pollutants, under the direction of Edward D. Goldberg of the Scripps Institution of Oceanography. The objective of this study is to assess the extent to which presently unsuspected substances produced by man may be accumulating in and affecting the marine environment. The substances to be examined will be selected on the basis of their production, their persistence in the environment, and their effects on the environment.

A main element in this study will be an intensive effort to assemble the best available data on the rates, routes, and reservoirs of these substances. This will be done this summer by a group of Research Associates. An outline of the types of data sought is attached. This fall, a workshop will be convened to analyze and evaluate information gathered during the summer study.

* * * * *

Sincerely yours,

RICHARD C. VETTER,
Executive Secretary.

OUTLINE FOR PREDICTING OCEAN POLLUTANTS DATA COLLECTION PROGRAM [SUMMER 1973]

The following data will be sought for each chemical under study. All entries will be fully documented.

I. INTRODUCTION—(BASIC CHEMICAL AND PHYSICAL PROPERTIES)

- A. Boiling point, melting point, vapor pressure, water solubility, etc.
- B. Chemical formula.
- C. Other basic data.
- D. Comments.

II. PRODUCTION (U.S. AND FOREIGN DATA)

- A. Data for last 5–10 years in metric tons :
 - 1. Total production.
 - 2. Sales.
 - 3. Consumption.
 - 4. Import/Export.
 - 5. Geographical distribution (map).
 - 6. Recycling.
 - 7. Other.
- C. Wastes (by-products and impurities associated with production),
- D. Leakage into the environment during production.
- E. Availability and adequacy of data.
- F. Other data.
- G. Comments.

III. MAJOR USES (FOR EACH USE)

- A. Use data over last 5–10 years :
 - 1. Total consumption.
 - 2. Import/Export.
 - 3. Geographical distribution.
 - 4. Recycling.
 - 5. Replacement time.
 - 6. Other.
- B. Projection of uses.
- C. Waste and by-products.
- D. Leakage to environment during use.
- E. Projections of new uses with some information as above.
- F. Availability and adequacy of data.
- G. Other data.
- H. Comments.

IV. ENVIRONMENTAL BEHAVIOR (ROUTES AND RESERVOIRS)

	Flux		Level		Persistence
	Natural	Man	Natural	Man	
A. Water:					
Rivers					
Lakes					
Oceans					
Sewers					
Subterranean waters					
Air					
Land					

- B. Mechanisms of environmental degradation, alteration or transfer :
 - 1. Photolysis.
 - 2. Metabolism by organisms.
 - 3. Uptake by organisms.
 - 4. Biomagnification.
 - 5. Sedimentation.
 - 6. Inorganic degradation.
 - 7. Other.
- C. Other.
- D. Comments.

V. EFFECTS

- A. Human Health :
 - 1. Direct.
 - 2. Indirect.
- B. Ecosystems.
- C. Other effects.
- D. Comments.

From their recent meeting in Chicago, they have decided to examine five or so classes of pollutants of potentially harmful natures: The transuranics; ocean litter, beach plastics, glasses, et cetera; synthetic

organic compounds, especially the low-molecular-weight halogenated ones; wastes being dumped into the oceans, including sewage sludges, slags from extractive metallurgical practices—the titanium waste problem. A publication will result from a workshop in the fall of this year.

I report to you that this collective advice, available to those responsible for the management of coastal waters, with respect to pollutant impact, has not been converted into active programs. I recommend that this be done.

Just as the oceans are a resource for food, for minerals, for transportation, and for recreation, so must we regard them as we do the rest of the globe as a resource for the management of human waste.

Insofar as our coastal waters are concerned, this resource management is part of the total problem of the coastal zone. In this respect, I would like to restate for the record the strong support expressed by NACOA in its first annual report to the President and the Congress of the Magnuson coastal zone legislation passed by the Congress and signed into law last year.

This was a key step needed for managing this resource. It is a matter of great disappointment that the administration has not funded the activities proposed in this legislation. I think it is just as important to activate the coastal zone management bill as it is to get on with the activities that are described in the reports I have cited.

NACOA considers this matter sufficiently vital that it will devote considerable space to this subject in its forthcoming report. Successful management of the coastal zone requires that the maximum correct information be made available at those levels of government that face immediate problems. I speak of municipalities, counties, and States.

The sea grant program has proven extraordinarily useful in this respect. It has developed very close relations with local governments throughout the country and provides an excellent vehicle for the transmission of the necessary technical and scientific information to planners. It is working well.

As unfortunately so often happens, just as the program is proving its real worth, it has come up against the stops of level funding, which will limit its usefulness at a time when the need for it is growing.

That is my statement, Mr. Chairman.

Senator TUNNEY [presiding]. Dr. Nierenberg, first of all, let me state that it is a pleasure having you before the committee.

Dr. NIERENBERG. Thank you.

Senator TUNNEY. As a constituent of mine, and I have had the opportunity to visit you at Scripps on one recent occasion, I know of your very deep interest, and the interest of many people at Scripps in matters that you testified about before the committee.

I was wondering how much money you feel should be appropriated for this coastal zoning legislation. As you know, the authorization bill provides \$48 million. Senator Pastore has suggested that perhaps appropriations for the fiscal year 1974 of \$12 million would be appropriate. Do you feel that \$12 million, considering the fiscal restraints that we find ourselves in at this time, is adequate to fund the programs, or do you feel that we need more than the \$12 million?

Dr. NIERENBERG. Before answering your question, or responding to it, I would like to introduce Dr. Douglas Brooks, who is executive director of NACOA.

I have to start from a base to answer your question. What serious thinking we did about the last year, we were talking about \$9 million in terms of the first year, and I will use that as my departure point.

That was approximately 1 year ago, and times have changed a bit. As I remember, in the first year, the administration intended, in that initial step, to put the money into planning and later allocate funds for administering effective organization in the States—if I recall the precise details—once the organizational setup is, in a sense, approved by the Federal Government.

It seems to us, last year, that \$9 million was a good beginning, from what we knew of the activities of the individual States. But we do now have more experience, Mr. Chairman. I don't need to be parochial, but California has passed proposition 20, the various regional commissions are working now. The statewide commission, which is responsible for overall standards and appeals and for developing statewide plans, is functioning. We have a better estimate of what our real costs are of getting this sort of operation going.

The State of California provided \$5 million that is not turning out to be adequate, by at least a factor of two. On that basis, and considering the needs of the other States, and the rate at which they would come into the program and so on, I dare say that something nearer to about \$20 million—and this is a very rough estimate—would be required for a good initial year. The initial outlay, as you know, never materialized. I think NOAA was able simply to keep the program office alive with a few hundred thousand dollars of reprogramed money. By now some States are ready to go. So I would say about \$20 million could be wisely spent in those first two functions of the act for planning grants and for approved program administration which are at the moment very important in the States beginning to come into the program.

Senator TUNNEY. That \$20 million would be more planning?

Dr. NIERENBERG. And the development of organization, you see.

Senator TUNNEY. And you feel, based on your expertise and the work you have done with the California Coastal Commission, that at least \$20 million would be needed?

Dr. NIERENBERG. For the first year, yes, sir. I am trying to add up rapidly, mentally, the various requirements in southern California. A fair amount of construction has already been done in the coastal zone. In other areas there could not be as intense a problem.

Overall, I think it would be about \$20 million.

Senator TUNNEY. Can you give some indication to the committee as to what you would expect would happen if the \$12 million is approved instead of the \$20 million?

Dr. NIERENBERG. Accomplishment would be at a slower pace. My assistant director, Jeffrey Frautschy, is on the San Diego Regional Commission, and also on the Statewide California Coastal Zone Conservation Commission, and I am in daily contact with the problems that these distinguished citizens face who serve on these committees. It is very difficult. They contribute their time—and a great deal of time—but they need a tremendous amount of staff help, a tremendous amount of research to settle the problems immediately at hand, not counting alone the planning that each State will require and the expertise that will have to go folded in.

It is too bad that these activities are not properly supported and the work of these citizens isn't carried out faithfully.

Senator TUNNEY. I understand that, but one of the things that has to be done when you are fighting for appropriations, particularly when you are trying to establish a priority for a particular activity is to have strong arguments; as strong as possible, in favor of a particular item for appropriation, and what I am simply asking you here today is to help supply us with some of the arguments that can be used, assuming we were to offer an amendment to increase the amount beyond \$12 million to the \$20 million, and I am not asking you to provide scare testimony to the committee, but I think that if you feel so strongly about this matter, that you have traveled all the way from California to testify, that perhaps you could give us some suggestions above and beyond the fact that the program would move at a slower pace.

Every program will move at a slower pace if it is not funded.

Dr. NIERENBERG. Of course it would.

Senator TUNNEY. Can you offer, in concrete terms, some suggestion as to what the result might be?

Let's take the California coast, which you are an expert on. As a matter of fact, I remember appearing at a press conference with you shortly before the election last year when we were trying to pass the coastline initiative, and you made some. I thought, salient points at that press conference for the passing of this initiative, proposition 20.

Could you offer to this committee some suggestions as to what might or might not happen on the California coast, assuming that these moneys are not made available to the extent that you have suggested they should be made available, \$20 million?

Dr. NIERENBERG. The word is "irreversible." The damage that is being done is irreversible. Buildings are built where they shouldn't be, beaches are being damaged where they need not be. Once these buildings are built legally, you can't do anything about them. You are perfectly correct. I think I was trying to lean over backward to be unemotional.

I will try not to be emotional about it, but you have to go down in our area, to Pacific beach right now, and watch the condominiums springing up one day to the next, literally like mushrooms, and the concerned citizenry is being overwhelmed by this process, because of this delay in the funding, the delay in the staffing, and the delay in their ability to develop the appropriate plans as required by the act, and the delay I was speaking of, and that I am concerned about, is the one that has as its result irreversible destruction of valuable areas. The blight that appears in this regard I consider extremely serious.

Because of the exponential growth now toward the seashore, each day's loss is worse than the preceding day's loss. But it is evident I don't really know how, in a few words, to describe it except to note the process going on right now in southern California. Even with the commissions functioning, the developments are not being ended because of their inability, because of the lack of staffing and money, to get on with the job that is assigned them.

So I think the damage that would be done by not properly funding this whole program is the loss of the valuable resource that we have in the beach areas. More and more is lost every day.

Senator TUNNEY. Has any research been done on this exponential growth that you talk about, and anyone that lives in California knows

it is taking place, but I haven't seen any statistics that could be used for purposes of getting a funding level of \$20 million, and I wonder if you would have access to such statistics?

Dr. NIERENBERG. Yes, I do. Let me quote one. It is not strictly on the point I was talking about, but it is related to it. There is a very striking statistic. We have beaches running from the northern California border all the way to the tip of Baja, California, some of the most beautiful in the world. We are losing approximately 10 miles of each a year because of mismanagement of this resource. That is quite a statistic. Even with the 500 miles of beach, that is quite a loss, and we are losing it two ways. That is because of the mismanagement of this extraordinarily valuable resource.

Dr. Douglas Inman, who can account for every grain of sand that has gone on or off the beaches of California since 1900, there is a straightforward figure, and that will keep going on until we get tight control of this very valuable resource.

Senator TUNNEY. Because of the exponential growth, we assume that within a year or 2 or 3 that the 10 miles per year would increase.

Dr. NIERENBERG. It is very complex, Mr. Chairman. The beach loss is actually worse than 10 miles a year, but the reason the net loss isn't as bad as it might be is because of the construction of marinas where sand is scooped out which allows replacement of the sand lost on the beaches. The marinas themselves are a disaster, but that is another question. The sand replacement has slowed down what would be much worse.

When the marinas stop building, this beach loss will accelerate. They supply the sand deficiency, to some degree. So this loss of beach in the face of this replenishment is an example.

But the figure I am giving you is an accurate figure, and it is a very bad one.

Senator TUNNEY. When will your official report to the Congress be issued?

Dr. NIERENBERG. I am speaking now as the chairman of the National Advisory Committee on Oceans and Atmosphere. I hope that by Tuesday our report will be finished. But unfortunately on the first of July, it goes to the Secretary of Commerce, and he has up to 90 days to write a point-by-point reply, and then both our report and the point-by-point reply go to the President and to the Congress.

Senator TUNNEY. Then it will be made public?

Dr. NIERENBERG. Yes, sir.

Senator TUNNEY. Dr. Nierenberg, I personally very deeply appreciate your coming back, particularly taking the Redeye, that being the night flight, from California to testify. There is no question but that your expertise is world-recognized in this area, and I think you have made a very valuable contribution to our deliberations.

I couldn't agree more with what you said. I think that it is a tragedy that we are not making moneys available in this area, because once you lose the beach, once you lose the estuaries, there is no hope of reclaiming them in their active form, at least, and I just can't understand why we cannot make funds available in this particular area, and we are not talking in the overall Federal budget about all that much money.

About \$20 million out of a budget this year which will be in excess of \$267 million or \$168 million. I just can't imagine that we as a Congress could not recognize that need. I think the problem in California is worse than in most other areas. Perhaps Florida is as bad, but California certainly is critical.

At any rate, I am deeply appreciative that you show such personal concern to come back at considerable sacrifice to yourself and make your statement.

Dr. NIERENBERG. Mr. Chairman, in the face of your gracious remarks, I should cease and desist, but you lead me to a line of thinking that I think is important. My remarks with regard to this are critical of the administration, or rather the OMB. They were intended to be, frankly, but there is a deeper problem here. I don't think the motivation—and I think I have every reason to understand what is going on—that the motivation in this particular case was a saving of money. I think everybody is concerned about the beaches. The problem, I think, is unfortunately more serious, and it has to do with organizational questions in the Government, conflicts between bureaus, the lack of centralization, and in this particular instance, I think there is reflected a struggle that went on last year before the passage of the Magnuson bill.

If I can put it in its best lights, and that is the way I would like to do it, a difference of opinion between those who feel they want a global package of water, land management, and air and everything, and others who feel we should get on with what we can do, and not get the beaches tangled in the very complex problem of land management.

Not having the strong central focus as we should in the Government for managing our oceanic and atmospheric resources, or oceanic resources at least, results in the kind of problem we face today.

I don't think it was a matter of saving the \$9 million last year, or \$20 million this year, but I think it was the more serious problem of very deep divisions in the Government as to administration, management, and agency conflict. I think these are the questions that also must be resolved fairly soon to get on with these important jobs.

Thank you, Mr. Chairman.

Senator TUNNEY. Let me ask you one very parochial question. Do you think the coastal commission in California is going to save the Tiajuana Estuary?

Dr. NIERENBERG. I think it has been done. When people stop talking about it, you know it is done. I would say in the last 3 months, it is no longer a problem. They are looking at solutions other than concreting the channel. It may have raised problems with Mexico, because there is a treaty, after all, but apparently, the slough is now saved as a result of these public activities.

That is an example of the vigorous commission, because it is a signal, and a very strong signal, to the power structure as to the way people want things to go, and that has been a wonderful achievement.

Senator TUNNEY. Thank you very much.

Dr. NIERENBERG. Thank you.

Senator TUNNEY. Our next witness is Dr. Erman Pearson, sanitary engineering, University of California, Berkeley.

Doctor, would it be possible to include your statement in the record, and would it be possible for you to summarize it and give us some conclusions that you have?

The only reason that I say that is that today we are going to run into some conflicts as a result of this executive session of the Commerce Committee, and we are in a time bind, and I would like very much to ask you a few questions, but we would not be able to do so if you read all your statement.

STATEMENT OF DR. ERMAN PEARSON, PROFESSOR, SANITARY ENGINEERING, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.

Dr. PEARSON. Mr. Chairman, that is exactly the intent of my paper presentation and my oral presentation, just to touch the highlights, with your permission.

I am Erman Pearson, and I have been a professor of sanitary engineering for 24 years. This is a position that has existed in our university structure for over 70 years. So we represent an area of engineering deeply concerned with environmental quality management.

My comments here today relate primarily to the coastal waste management aspect of ocean pollution. I have three objectives in my presentation; first, to summarize very briefly some of the studies related to coastal areas that have been ongoing in California for many years.

Secondly, to suggest that this subcommittee carefully consider pressures to develop bans on the disposal of certain wastes to the ocean, or to develop uniform requirements for waste treatment universally because neither of these necessarily results in a significant improvement in environmental quality, because of the side effects which I will comment on, too.

First, I would like to review briefly some circumstances in southern California. Marine waste disposal in southern California consists primarily of mechanical treatment, separation of floatable material, and settleable material from waste streams, and the discharge of the clarified effluent through large submarine pipeline systems. When I say large, I mean systems that extend 1 to 5 miles in the ocean, discharge at about 200-foot depth through long perforated pipes which we call diffusers to effectively disperse the waste in the environment.

The sludges from these processes are digested or fermented anaerobically and in part separated and sold as agricultural or soil conditioners, and in part, the finer fraction, discharged through, in some cases, especially designed pipelines into the sea, and in other cases along with the effluent from the treatment plant.

When I refer to southern California we are talking about essentially the area from Point Conception to the Mexican border. It represents a coastal population of today about 11 million people, and it represents the discharge of about 1 billion, and that means 1,000 million gallons a day of treated sewage through these kinds of systems.

Senator TUNNEY. When you say 11 million, how far inland are you going?

Dr. PEARSON. Well, in the Los Angeles area it includes essentially the entire Los Angeles basin. It represents most of the coastal metro-

politan population. We are talking about the coastal area from Santa Barbara to the San Diego area.

First, this area in southern California has been very much concerned about waste disposal practices and its effects. Four years ago a joint power agreement brought about the formation of a special organization, the southern California coastal water research project (SCCWRP) to undertake a rather substantial, more than \$1 million ecological study of conditions on the coastal shelf, not just related to waste disposal but concerned on a broader basis to man's effects on the water, including waste disposal.

There has been issued recently a report, a copy of which I have before me, and I made a copy available to the staff of the committee, which represents the first 3-year findings of this study.

I might say, related to questions posed earlier today about whether there are studies of this nature going on, that this study is continuing, funded primarily by the local agencies at about the \$3¼ million level. So it is a sizable undertaking which was motivated originally by governmental agencies concerned with waste management responsibilities.

I have summarized some of the conclusions verbatim from this report starting on page 3, and they go for essentially two and a half pages. They relate to specific waste characteristics, and their apparent effects in the receiving waters.

No. 1 is plant nutrients, and the conclusion, these are verbatim statements from the report. "There is now no justification for altering present treatment discharge practices with regard to the plant" and so forth.

This special project has a manager, and it is guided by a consulting board, four scientists and an engineer, the chairman of which is Dr. John Isaacs of the Scripps Institution of Oceanography so that it is steered by competent scientific people, at least with respect to the scientists. As an engineer, I am also on that board, and I won't speak as to my competency.

I would like to refer to the summary conclusion about waste management practices and their implementation which is No. 2 in my summary statement.

"To the best of our knowledge, no potential effects other than those indicated herein will require major investigation." The "effects" referred to relate to floatable materials and toxic materials for which source control is the most effective means.

Summary statement No. 3 indicates that no substantial modification of present waste disposal practices, other than improved removal of floatables and source control of toxicants, is justified at present. Obviously this is not the ultimate, but it represents a good step, and the condition of the sea is not in "bad" shape, as is frequently alleged. For those concerned with detailed findings of this study I refer them to the full SCCWRP report which has 120 specific findings.

Now, I would like to make a couple of comments about the hazards or dangers associated with bans, and uniform or blanket wastewater treatment requirements and their application without concern for local conditions.

First with respect to bans, it is popular to talk about "no waste discharge." What that really means is yet to be defined, but it will probably never occur as long as man is on the Earth.

I think that point should be recognized more widely than it is in the clarion call for that common objective of "no waste discharge." Let me try and apply this to the problem of sludge disposal, and it was currently of major concern in southern California.

Digested sludge is the treated underflow from waste treatment processes. These materials among others are discharged into the southern California coastal area by especially designed systems, and for the most part, with a high degree of effectiveness.

Nevertheless, there are those that say sludges should not be discharged into the sea because of their trace metal content or other toxic materials. But even those who advocate no ocean discharge appear to be advocating using the sludge on land, and the organic farmer feels that is the most proper use. I would like to point out that, in my judgment, first, if there is any significant hazard associated with the discharge of the sludge, and I don't believe there is, but if there is, we are far better off putting the sludge in the sea than putting it on the land. Studies have shown that if digested sludge is discharged properly at sea, only the larger particles settle close to the discharge. The small particles are dispersed in the ocean water and ultimately settle over a large fraction of the ocean floor.

Theoretically the sludge could settle over the bulk of the ocean floor in time. Correspondingly, the concentration, grams of toxicant per square meter of area on the bottom decreases as the area over which the sludge is dispersed increases. Digested sludge is just one small fraction of the organic fallout that normally occurs on the ocean floor.

These materials that do settle to the ocean bottom are being covered continuously and are removed from contact from the water and the organisms that live in it, and ultimately man, so that it is essentially taken out of contact with our living resources.

What happens if you put sludge on the land? First, the fraction of the land area over which the sludge can be spread is a very small percentage of what would be the ultimate dispersing area in the sea. Whatever materials are in the sludge will be concentrated in time in the surface soils and agricultural practices continue to keep it in the surface layers. These materials will enter into the flora and fauna of the area, and ultimately into the human food chain and man himself probably at a much more rapid rate than if you put them in the sea.

I am not saying that the disposal of these materials on land is bad. In fact, it is currently being practiced, and nobody has ever shown any significant hazards. But what I am saying is that there is very little logic for banning digested sludge discharge to the open sea. So, whenever bans are posed, one ought to look seriously at the possible and real consequences of alternative methods of handling the waste because ultimately we have some waste residue that must be disposed of in our environment.

Senator TUNNEY. I would assume that it would depend upon one's ability to get the sludge into the sea as to whether or not that alternative is viable as contrasted with landfill.

I am thinking particularly of inland areas, where maybe the only means of disposing of the sludge would be into rivers as opposed to land fill, and what might be a reasonable plan to move sludge into the sea if you are living in a coastal area, would be unreasonable if you lived in an inland area.

Dr. PEARSON. That is perfectly correct, Senator, and that is the point I want to make in point 2, about uniform or blanket disposal requirements. My remarks relate to coastal regions, and where you have the open ocean suited for this type of disposal.

Regulations regarding waste management must consider local conditions, uses, and requirements rather than follow what becomes easy to administer, an approach which requires the same thing of everybody, regardless of the situation. Let us consider the blanket approach of requiring secondary treatment for all waste discharges. Secondary treatment as defined by EPA simply means 85-percent removal of the biochemical oxygen demand (BOD) and suspended solids or a concentration of BOD or suspended solids less than 30 parts per million, whichever is the more restrictive.

This is to be applied uniformly for all discharges, whether a city is located at the head of the estuary on Podunk Creek or on the open ocean. This is a very ineffective approach to waste management, and it should be reassessed if it is really going to be implemented. Let me make a couple of specific points. First, there has been no study to show that for well-designed sea disposal systems that BOD or suspended solids are at all a problem. They are in fact not.

Secondly, the imposition of uniform requirements of secondary treatment for the waste treatment-disposal systems like we have in southern California, which are primarily, mechanical, with biological digestion of the sludges, secondary treatment will cost twice as much as present practice. This will mean expenditures to provide secondary treatment of about three-quarters of a billion dollars. If we are going to spend money on waste management, it seems to me it ought to be directed toward the specific problems that ought to be identified, not just follow traditional and expensive approaches.

Two additional points can be made. A blanket treatment approach requiring 85 percent removal, or 30 parts per million in the effluent of BOD, suspended solids or anything considers the same value or significance to a small flow of 20,000 gallons per day as compared to one that is 100 million gallons a day.

There is inequity of requiring sophisticated treatment, particularly for the smaller systems. Too often the assumption is made that these treatment systems are functionally designed to perfection, and that operators and equipment never fail or falter. The more reliance we place on sophisticated treatment processes, we must also be sure that we have adequate safeguards for their continued high level of operation. This is particularly true where adequate dilution is not available to reduce the concentrations of the residual wastes to insure the protection of the environment.

One of the big advantages of the large wastewater dispersion systems in southern California is that they do effectively dilute; more than a hundred to 1, the treated wastewater with the seawater. Thus with respect to the waste constituents that are not present in seawater at significant concentrations, these dispersion systems affect removal than any designed treatment process to date. In other words, a dilution of 100 to 1 is equivalent to 99 percent removal with respect to the pollutant concentrations in the receiving water. Don't misunderstand me, I am not advocating that "dilution is the solution to pollution." Nonetheless the degree of safeguard or back-up or sophisticated treatment processes must consider the terminal dilu-

tion available if we are serious about protecting our environment. Terminal dilution is the only safeguard for the environment for those substances that the treatment processes do not remove, that go through the plant virtually unaffected. So much for my comments. I would like to read my conclusions.

Senator TUNNEY. Please do.

Dr. PEARSON. Conclusions and recommendations:

Based upon the comments presented and the principles considered, it is strongly recommended that this subcommittee consider seriously the following:

1. In areas such as southern California where open waste disposal practices are at a high level of technology and the ecological effects of such practices have been studied, at least in a modest way, in the words of the SCCWRP report (3), "the health and condition of the southern California coastal waters and inhabitants are such that there is little cause for serious concern."

2. The blanket application of inland wastewater disposal policies and practices to marine waste disposal such as in the southern California Bight is technically unsound.

3. Regulatory policies that involve complete bans on certain waste disposal practices should be examined closely to insure that the alternative practices may not create even more serious environmental problems. Such may be the case with attempts to ban completely the disposal of digested sludge solids in the ocean.

4. Regulatory agencies and policies should consider carefully blanket or uniform waste treatment method requirements that do not consider the size of the discharge, the characteristics of the waste, the condition and uses of the receiving water, and the quantities of diluting water available.

5. Requirements for particular levels of wastewater treatment should consider the waste dilution system as part of the treatment and disposal system and the dilution capabilities available should influence both the degree of treatment required as well as the required fail-safe characteristics of the design.

6. Regulatory policies that do not promote or encourage the development of regional wastewater management systems should be examined critically for their merit.

7. Appropriate agencies of the Federal Government should join with local agencies and organizations and encourage scientifically and technically sound ecological studies of the coastal shelves, particularly in areas subject to significant waste discharges. A good example of a modest start in this direction is the ecological study undertaken by the local governmental agencies of southern California—the Southern California Coastal Water Research Project.

Thank you.

Senator TUNNEY. Can you tell me how the Water Quality Act of 1972 is being implemented in California or other parts of the country to your knowledge, as it relates to disposal of effluents in coastal areas, and whether you feel that the implementation of that act by the Environmental Protection Agency has been to date effective.

Dr. PEARSON. That is a complicated question but I will try and restrict my remarks to my understanding of how it is going to be applied in California, how it is going to be applied elsewhere remains to be seen.

I understand EPA has given California the right to enforce that legislation on behalf of EPA. California has demonstrated to EPA that their requirements are equivalent to those at EPA. In order to meet the Federal requirements, California has developed a set of requirements that appear to be even more restrictive than the Federal requirements. In other words, the effluent requirements and receiving water conditions are more restrictive than specified by EPA in accordance with that legislation.

The question is, how are California agencies and organizations going to meet these requirements? I might say I don't know, and I don't think any of them know either, but they are vigorously at work starting to engineer candidate systems, which they must do if they are going to meet the deadlines.

What are they doing? Well, they are doing what logically I guess what anyone would do, since they don't know how to meet these even more restrictive requirements, nor do I think they believe in them. For the most part, they are designing conventional secondary treatment systems, and the cost of increasing the degree of treatment, is going to be about \$750 million. Many of us feel that the bulk of those moneys will be wasted. That is how I understand the enforcement of that legislation is going to be practiced. I assume it will just be limited practically to EPA's requirements of secondary treatment which, to discharges on open coastal waters, in my judgment, has very little relevancy.

Senator TUNNEY. Can you just tell us what specifically you feel the Congress ought to do now with respect to actualizing some of the conceptual concerns that you have outlined in your conclusions and recommendations?

Dr. PEARSON. There are a number of things that could be done. Much of it relates to having technical competence in establishing limits or criteria, and having a regulatory basis which utilizes the technical competence available.

First would be to support more studies of the type mentioned so that there is hard, reliable data upon which regulations can be proposed. The arena for "blanket requirements" comes when nobody knows much about anything, and that is what we need to avoid. In waste management, we could save tremendous sums of money if there were more, not necessarily just research, but field investigations that develop pertinent data related to the management of the systems.

Second, I think this committee should be sure that the Federal regulations are not primarily of the "blanket type," easy to administer criteria that appear equitable, like everybody has to have secondary treatment.

If they do, if you have to have it for open sea discharge with a dilution of 100 or 200 to 1, what type of treatment should a city have on "Podunk Creek" with essentially no dilution of its effluent?

Also the regulations don't, since you have to apply the same degree, and essentially the same costs, now, the costs go down as the size of the system goes up, but essentially the same cost, there is no economic incentive for the city inland with limited dispersion or dilution capabilities to ever get their wastes out of the area.

A classic example is San Francisco Bay where technical studies indicated that the solution was to provide treatment suited to deep sea disposal, but the easier, political, and apparently more equitable solu-

tion is to require high degrees of treatment locally and put the treated effluents in the bay. This treatment, maybe it will have a little more sophistication than at present, but there are going to be process failures.

Then, what is going to happen to the bay? It is going to put loads on the bay that will cause gross deterioration if the treated wastes ultimately are not taken out of the bay, simply because there is not adequate diluting capability for the residuals from the treatment processes.

Senator TUNNEY. That is very hopeful. I was a member of the Public Works Committee when we passed the Act of 1972, and I helped to draft that legislation. I think your comments on it are most interesting.

We really appreciate your giving us the benefit of your knowledge, and I wish that we could spend many more minutes cross-examining you or examining you on the things which you have said.

We are running into a time problem. We have other witnesses, one more witness, and so I am going to have to at this point excuse you, but I want you to know that I am personally as a citizen of your State, deeply concerned about these same problems, and I think that the insights that you have given to us will be very helpful to this committee.

Dr. PEARSON. Senator, could I take 1 minute to comment on a question raised by Senator Stevens earlier?

Senator TUNNEY. Yes.

Dr. PEARSON. The question was raised, what is the effect of oils, have there been any studies, are these significant, does the concentration of oil of 10 parts per million make any sense?

There have been studies in this area, in southern California which have included health of the fish, and planktonic organisms and so forth. They have included an area where the discharge of hydrocarbons each year to the sea is greater than that released in the Santa Barbara channel during the first year of the noted oil well failure. I am referring to two main municipal wastewater discharges, the city and county of Los Angeles, and these combined discharges, with an equivalent hydrocarbon concentration considerably greater than 10 parts per million, that fraction which can be attributed to oils, contribute to this area of the coastal shelf of Los Angeles, each year more hydrocarbons than was released during the first year of the Santa Barbara oil well failure. Yet, that amount of hydrocarbons dispersed in that area apparently has not had any significant effects on the fisheries in the area. I can't say this absolutely, but at least fishery experts today have indicated that this is one of the findings of their studies.

Thank you.

Senator TUNNEY. Thank you, very much.

[The statement follows:]

STATEMENT OF DR. ERMAN A. PEARSON, PROFESSOR AND HEAD, SANITARY
ENGINEERING, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.

INTRODUCTION

Mr. Chairman and members of the Subcommittee on Oceans and Atmosphere, it is a pleasure to appear before you to discuss problems of ocean pollution and coastal waste management. I am Dr. Erman A. Pearson, Professor and Head of Sanitary Engineering at the University of California at Berkeley where I have been engaged for over two decades in teaching, research and professional engi-

neering practice devoted in major part to marine waste disposal problems. Interestingly, the position I occupy is concerned with the engineering of water and wastewater management systems for the protection of public health and environmental quality and has been in existence for over seventy years. I come before you as a "practicing ecologist" with an extensive background of experience with environmental quality and not as a representative of the "instant ecologist" fraternity, many of whom have just discovered the environment with accompanying cries of alarm. I am deeply concerned about the quality of our environment, and I have dedicated my professional career in efforts to achieve the maximum environmental quality improvement for every dollar spent on its behalf. It is with this continuing objective that I appear before you today.

A few words about my background. I was raised in the water business, my parents were owners of a private water supply utility. I am a graduate of the University of Washington with a doctorate in sanitary engineering from the Massachusetts Institute of Technology in 1949. In the mid 1950's I was appointed Chairman of a Marine Research Consulting Board to the State of California Water Pollution Control Board where we advised on the appropriate character and conduct of coastal water quality studies to help guide the State in its coastal water quality control program. I organized the first International Conference on Waste Disposal in the Marine Environment which was held at UC Berkeley in July, 1959, and the Proceedings of the Conference were printed and distributed in book form. I have served as a member of the Governor's, and later the Legislature's, Advisory Commission on Marine and Coastal Resources throughout its existence (8 years). I am a member of the National Academy of Engineering's Marine Board. I have served as Co-Chairman of a joint National Academy of Sciences/National Academy of Engineering (NAS/NAE) Workshop on Waste Management Concepts for the Coastal Zone—"Requirements for Research and Investigation"—which resulted in a NAS/NAE publication in 1970. I have recently served as Area Chairman of the Input Panel for the NAS sponsored workshop on the Input Fate and Effects of Petroleum in the Marine Environment held in Arlie, Virginia, 21-25 May, 1973.

During the past twenty-odd years I have been actively engaged as a consulting engineer and/or as a member of boards of consultants for many coastal waste disposal projects. In the United States I have advised on waste management systems for the Cities of Los Angeles, San Diego, Honolulu, San Francisco Bay Area, and New York. I have also been a consultant on marine waste disposal management in Accra, Ghana; Bilbao, Spain; Bridgetown, Barbados; Cork and Waterford, Ireland; Durban, South Africa; Göteborg, Sweden; Istanbul, Turkey; Maracaibo, Venezuela; and Rio de Janeiro, Brazil among others. I also have had the good fortune to spend a sabbatical year in Sweden in 1970-71 serving jointly as a Visiting Professor at the Royal Institute of Technology, Stockholm, and as an Adviser to the Swedish Environmental Protection Board (Statens Naturvårdsverk). As you may observe, my experience has covered a broad scope of environmental quality activities ranging from teaching and research to engineering practice in system design.

STATEMENT OBJECTIVES

This presentation is directed toward three main objectives which can be summarized as follows:

1. To report that although many questions remain unanswered and much continued study is needed, in urban areas such as southern California where well-engineered marine wastewater disposal systems have been constructed, the condition of the nearshore ocean waters is generally very good as shown by the findings of a recent, locally funded, multi-million dollar study of the coastal ecology.
2. To suggest that this Subcommittee review carefully and cautiously, requests for the complete banning of treated wastewater discharges (including sludges) to the ocean or blanket requirements regarding the degree of treatment of all municipal and industrial wastewater.
3. To recommend strongly that this Subcommittee provide leadership and guidance to appropriate governmental agencies, including the Environmental Protection Agency, concerning the development of realistic objectives and requirements for wastewater treatment and disposal considering both wastewater characteristics as well as disposal locations and requirements.

SOUTHERN CALIFORNIA CONDITIONS

Marine municipal waste disposal practices today in the Southern California Bight (essentially from Point Conception south to the Mexican border) consist mainly of mechanical (primary) treatment (with sludge digestion) with the liquid effluent discharged through submarine pipelines (from 1 to 5 miles offshore) with long (thousands of feet) multi-port outlets (diffusers) at depths of about 200 feet. These dispersion systems are designed to achieve an average initial dilution (at the source or outlet) of in excess of 100 to 1 (100 parts sea water to 1 part wastewater).

Concern about the effect of these wastewater discharges upon the local ecology brought about the formation of the Southern California Coastal Water Research Project (SCCWRP) in 1969 as a local government agency organized by a joint power agreement between the five government agencies responsible for managing most of the municipal wastewater (1 billion gallons per day) discharge into the ocean off southern California.

The agencies are Ventura County, the City of San Diego, the City of Los Angeles, the County Sanitation District of Orange County, and the County Sanitation District of Los Angeles County.

The agencies entered into the joint agreement since it was believed that their previous research programs would benefit from the addition of a project with regionwide focus.

From the outset, control of the \$1.1 million program was delegated to a commission of local civic leaders and elected officials in order to reflect—in an unbiased manner—the current public interest in environmental quality and to establish an atmosphere free from partisan pressures. This arrangement has given the project freedom from control by other agencies and freedom from political pressure fostering a broad and balanced viewpoint.

The basic goal of the SCCWRP undertaking is to increase the understanding of the ecology of the coastal waters off southern California and to analyze the effects of man's activities (especially municipal wastewater discharge) on the marine environment.

Overseeing the work is a consulting board of experts headed by Professor John D. Isaacs, Scripps Institution of Oceanography, Chairman, and Members, Richard K. C. Lee, M.D., former Director of Public Health for the State of Hawaii, Professor Erman A. Pearson, Sc.D., University of California, Berkeley, Professor Donald W. Pritchard, Ph.D., Director of Chesapeake Bay Institute and John W. Ryther, Ph.D., Woods Hole Oceanographic Institution. The Project Manager is George E. Hlavka, Ph.D.

The SCCWRP has just recently released a 531-page report which is based upon three years research which states in part that "the health of southern California coastal waters and inhabitants are such that there is little cause for serious concern."

In the interest of brevity, the following specific quotations have been abstracted from the Conclusions and Recommendations (Chapter 12) of the report with respect to specific waste constituents and their implications for water quality management.

(a) *Plant Nutrients*.—There is now no justification for altering present treatment and discharge practice with regard to the gross plant nutrients introduced into southern California waters.

(b) *Particulate Material*.—Because of the generally minor and reversible nature of the effects and the uncertainty as to the actual consequences of the most well-intentioned corrective actions, there is presently no justification for any major alteration of waste management or discharge practice from the effects of particulate materials. There is need for further study of the distribution of potentially irritating substances, the nature and causes of fin-erosion disease, benthic community alterations, and possible secondary effects of wastewaters on kelp.

(c) *Floatable Material*.—The present practice of wastewater treatment and discharge should be reviewed and modified to minimize the discharge of all types of floatable materials.

Further studies on floatable materials associated with wastewater discharge are necessary.

(d) *Microorganisms*.—Present southern California practice of wastewater discharge and the achievable bacteriological standards for bathing waters more than adequately protect those using southern California coastal waters for water contact activities. The present established practices and standards for shellfish

sanitation control are adequate to protect the public and the utilization of this resource. Their application and enforcement should be continued.

With the exception of further control of the discharge of floatable materials and their associated sewage microorganisms, there is no basis for alterations of present southern California waste discharge practice for reasons of bacterial and viral infection or hazard or resource damage.

Mexican practice of sewage discharge should receive further study.

(e) *Trace Elements*.—There is no substantive evidence that would support major changes in present wastewater processing and discharge practice for reasons of its trace element content. Nevertheless, improved control of the discharge of highly toxic metals is a prudent and meaningful step in wastewater management.

Inputs of trace elements from direct industrial discharge, ship antifouling treatment, dredge spoil, runoff, aerial fallout, advection and other sources should be better quantified.

(f) *Trace Organics and Pesticides*.—There is ample evidence to require the elimination of chlorinated hydrocarbons and other persistent organics from wastewater to lowest practical attainable levels. Strict control at the source is strongly recommended.

The thoughtful monitoring of effluents and the organisms of southern California for chlorinated organic material, other halogenated compounds and other organics is essential, and presently unsuspected substances must be considered in an active program.

(g) *Summary*.—1. The application of inland wastewater disposal policies and practices to marine waste disposal, such as in the Southern California Bight, is technically unsound. For example, typical inland requirements for removals of biochemical oxygen demand, suspended solids, and nutrients from municipal wastewaters have little technical justification or relevance to marine ecological problems.

2. To the best of our knowledge, no potential effects other than those indicated herein will require major investigation.

3. Similarly, no substantial modification of present wastewater disposal practices, other than those recommended herein, is justified at present. However, the investigations of the specific problem areas as recommended may indicate the desirability of future additional modifications in wastewater disposal practice.

4. Routine monitoring and competent investigations of specific problems should continue, to determine man's general effects (including those of wastewater discharges) on the environment of the Southern California Bight.

Those interested in the detailed findings of this investigation are referred to the entire report including its 120 specific findings and the full Chapter 12 on Conclusions and Recommendations.

HAZARDS OF COMPLETE BANS ON BLANKET REQUIREMENTS

It appears popular today to yield to the clarion call for "no waste discharge." It is not exactly clear what such terminology means but it appears likely that such a goal will not be attained as long as man inhabits the earth. Nonetheless, the prime objective of waste management should be to limit the discharge of waste materials so that the minimum adverse ecological effects occur; and, wherever possible, the system design should produce beneficial environmental effects. All too often the latter has been neglected as a real possibility. It must be recognized that decisions taken to ban the disposal of waste material to a particular sink, such as the ocean, generally results in the transfer of the waste, possibly with a change in character, to one of the two remaining ultimate sinks—to the land or to the atmosphere.

Let us examine briefly the likely impact of a complete ban on the discharge of digested sludge (treatment process underflow) to all water bodies including the ocean. A ban on the disposal of sludge to inland rivers and lakes used for domestic water supply appears to be sound and logical. However, the extension of such a policy to the oceans does not appear to be logical. Many of those advocating the ban on digested sludge disposal to the ocean advocate strongly the recovery of such materials for application to agricultural land as a soil conditioner. This is done to make use of the humus and nutrient content of the digested sludge. Yet, one of the major objections to ocean disposal of such materials is the trace toxic substance content (largely trace metals) of the sludge, and the entrance and possible concentration of these materials in the food chain of the ocean. If this is a legitimate concern about ocean disposal

of municipal sewage sludge, what should be the concern about agricultural or land application of these materials. In my view, following similar logic the concern should be greater about land disposal. Why? Studies of digested sludge discharge to the ocean through well-designed systems, such as for the City of Los Angeles (a 7 mile 290 foot deep outfall), indicate that very little sludge solids are found near the outfall site. Most of the solids are very fine particles in the micron size range and are mixed and transported over large distances. These solids settle slowly over large areas—theoretically and ultimately over a major fraction of the ocean bottom. This area can be expected to be a substantial fraction of the entire land surface; hence, the concentration of sludge solids (grams/meter²) can be expected to be very low. This neglects the continuous covering of these solids by the normal oceanic sedimentation processes of which the sewage sludge component is only a very minor part. In time as the result of sediment deposition, a substantial portion of the sludge solids are removed from contact with the water, biota, and ultimately, man. One can therefore hypothesize that the ecological effects would be very minor.

What happens if sludge disposal is practiced on agricultural land as advocated strongly by the "organic farmer?" If the sludge contains appreciable toxicants, these materials are concentrated in the surface mantle to a degree far greater than in the ocean. This is due to the fact that the mass rate of application to land surfaces (grams solids/meter²-year) is much greater than to the ocean because of the very limited land area for agricultural application of sludge solids—at least compared to the distribution on the ocean floor. Also agricultural tillage practice retains the solids and toxicants (if any) in the surface soil mantle where it has more direct contact with plants, animals, and ultimately man, than in the ocean. Thus, which disposal method has least cost and minimal ecological consequences and health risks? I contend that well-engineered digested sewage sludge solids disposal to the ocean, including effective initial dispersion of the solids has less ecological consequences and health risks than disposal on land. From an ecological and cost standpoint, incineration and disposal of a fraction of the problem to the atmosphere has not been considered and it isn't considered seriously in California.

Specification of a blanket waste treatment method policy for all coastal waste dischargers poses a similar dilemma in achieving optimum benefits for each dollar spent for ecological improvement. The recent EPA requirement of secondary treatment for all waste discharges whether it be to the open ocean or Podunk Creek poses real cost-consequence problems. As mentioned previously, essentially all of the major Southern California waste dischargers employ today only primary treatment with effective long deep outfall dispersion systems. Secondary treatment is defined by EPA as 85 percent removal of biochemical oxygen demand (BOD) or 30 mg/l of BOD and suspended solids (SS) in the effluent, whichever is more restrictive. It is recognized that secondary treatment may also increase slightly the removal of heavy metals and toxicants over that removed by primary treatment; however, the increased removal is minor and the cost is great. Also, secondary treatment generally doubles the actual unit cost (\$/million gallons treated) of primary treatment, and what are the benefits? As has been demonstrated in Southern California practice, BOD (oxygen demand) and SS (suspended solids) concentrations are not problems of consequence in well-designed marine municipal waste disposal systems. This stems from the fact that open ocean disposal accomplishes high dilution of the waste with ocean water-dilution in excess of 100 to 1. This dilution results in concentrations of these constituents in the ocean/wastewater mixture at the outlet equivalent to removals of about 99 percent by treatment without dilution. Regrettably, the secondary treatment, minimum dilution system was tried in California in the early 1950's, it failed, and the current reduced treatment-high dilution systems were designed, built and have operated most satisfactorily to date as documented by the SCCWRP report (3).

A possible and likely negative result from a blanket secondary treatment requirement for all coastal cities is its impact on the development of regional waste management systems. If all cities are required to have secondary treatment regardless of receiving water conditions (including effective dilution on water quality), what incentive will there be for a city located at the upstream (head) of an estuary to move their secondary treated waste discharge location downstream at added expense simply to increase the physical dilution of their waste? Or similarly, why should a city transport its waste out of the estuary,

where dilution of the waste is minimal, to the open ocean where high dilutions are possible? With blanket treatment requirements there is no economic incentive for a city to transport its waste to areas of high dilution nor to join with other municipalities to accomplish the same objective. Instead the incentive is on "going it alone," applying secondary treatment at all locations where wastes are generated. There will be little if any effort devoted to the transport of wastes out of estuaries or areas of low dilution capabilities. Instead, we will overload and possibly destroy our estuaries before this error is realized or admitted. Historically, most of our severe water quality problems have occurred in estuaries rather than in the open ocean associated with well-engineered outfalls. Yet we seem to be committing ourselves to a policy that will destroy our estuaries before we seriously consider the real advantages of engineered treatment and ocean dispersion systems with accompanying high waste dilutions.

Another possible approach to increase the incentive for the development of regional systems in estuarine-coastal waste management is as follows. If secondary treatment is to be required for open coastal waste disposal systems with high dilutions (i.e., $>100:1$), then treatment markedly higher than secondary should be required for estuarine dischargers where physical dilutions are minimal—often in the range of 10 to 30 :1. But what should that treatment be? Will the increase of BOD and SS removals from 85 to 95+ % solve the problem? But what if BOD and SS are not the critical estuarine problems? Moreover, it appears that BOD and SS are not the major problem in many estuaries, such as in San Francisco Bay today where BOD and Suspended Solids concentrations are of little consequence. Instead, toxicity and floatables appear to be major problems, and treatment requirements and the required funds should be directed to solving specific water quality problems—not just adding more and more classical treatment processes to increase removal of BOD and SS. Logically then, if secondary treatment is to be required for open ocean waste disposal systems, a higher level of treatment (and likely twice the cost of conventional secondary treatment) should be required for estuarine discharges. Are the costs of adding more and more sophisticated treatment processes for BOD and SS removal justified and are the benefits tangible? Based upon present information, this trend, though supported by some designers and equipment suppliers, may not improve significantly environmental quality, and its cost/effectiveness is very high. And significant improvement in environmental quality will not occur until such time as waste treatment policies, regulations, and designs are directed to specific water quality problems rather than by a "lumper" treatment method approach. It is recognized that the "lumper" approach of specifying traditional treatment method requirements "across the board" may appear to be equitable and easy to enforce. However, will it solve the real pollution problem? I fear that we will run out of funds for environmental improvement following this approach long before we resolve our important water quality problems.

Two additional points should be made regarding the uniform treatment method requirement approach.

Does it make much sense to require 85 percent removal of the BOD or whatever, from a 10,000 gallon per day flow—a few pounds per day at a cost per unit of flow, or per capita, several times that required for 85 percent removal from a 100,000,000 gallon per day flow? In the latter instance the removal is measured in tens of tons per day.

Increasing reliance on sophisticated treatment processes without concern for terminal dilution for the treated waste stream in the environment places real protection of the environment in a precarious position. I have observed few, if any, treatment process systems that performed uniformly and continuously as predicted in design or that did not on occasion either fail or require shutdown for maintenance or other reasons. Without adequate terminal dilution for these periods of upset or decreased performance, what happens to the pollutant concentrations in the receiving waters? They increase markedly and of course additional stress is placed on the environment. With high terminal dilutions such as experienced with present day ocean disposal systems in California, this stress is markedly reduced.

Senator TUNNEY. Our final witness is Mr. Lawrence Hargrove, director of studies, American Society of International Law.

**STATEMENT OF JOHN LAWRENCE HARGROVE, DIRECTOR OF
STUDIES, AMERICAN SOCIETY OF INTERNATIONAL LAW**

Mr. HARGROVE. Thank you, Mr. Chairman.

I am cognizant of the lateness of the hour, and I do have a written statement of some length which I would propose to submit to you, and if you agree now, I will simply summarize the main points.

The main purpose of my appearing before you is to make some remarks and to suggest conclusions about international law and the protection of the ocean environment.

This is a timely topic, and it is conventional wisdom to say so, but I think it is important to recognize at the outset why the protection of the ocean environment is peculiarly timely now.

The reason is that the world community is now engaged in a great international legislative undertaking, the negotiations underway for the Law of the Sea Conference with which you are familiar, which will very likely result in fundamental revisions of the law of what is called ocean space.

The thrust of my remarks is that the fact of these negotiations, and the fact of their character as an essentially constitutional lawmaking process for the ocean, create very substantial risks as well as substantial opportunities with respect to the interests that the world community shares as a whole in the protection of the marine environment. Consequently by far the most important decisions that will be made in the near future at the international level will be made in the near future at the international level will be in the Law of the Sea Conference, and not in other forums that are concerned with more technical and specifically regulatory matters of ocean environmental protection, such as the Intergovernmental Maritime Consultative Agency (IMCO), or the United Nations Environmental Program recently established.

In my prepared remarks, I comment on the work of IMCO, and identify, as other witnesses have before me, the significance of the treaty regulations which IMCO has produced, directed exclusively to the area of pollution by vessels.

I comment also on the Ocean Dumping Convention, the general convention recently concluded which is directed toward another form of vessel pollution, pointing out that this is the most highly developed body of regulatory law in the marine-pollution-protection field, but that even at that it is regulation in a fairly crude sense. It is regulation by treaty, which is cumbersome to bring about, and cumbersome to change.

It is of significance to note that the United States in the person of Chairman Train, if I am not mistaken, has only in the last week or 10 days proposed to IMCO the adoption of a more sophisticated regulatory mechanism in the form of a permanent committee of IMCO which would have jurisdiction over vessel pollution, and would be able to regulate through the enactment of binding law by utilizing one of the familiar methods of international regulation.

Senator TUNNEY. I would think you support what Chairman Train is suggesting?

Mr. HARGROVE. Yes; I do support it, but it is important to understand the significance of this move in an overall perspective. And the

significance, while genuine, certainly is not of such scope as to lead us to conclude that the problem of international protection of the marine environment is going to be satisfactorily met by this one move.

I comment also on the role of the United Nations Environmental Program, pointing out that this newly established organization, within the United Nations system, will have an important role in alerting the world community to problems in the environment itself and problems relating to the development of global policy, and will have an important role in coordination with genuinely regulatory agencies within the United Nations system. It is not, however, an operational or regulatory agency and therefore cannot be relied upon to do the kinds of jobs of lawmaking that in my judgment are required with respect to protection of the marine environment.

I then comment on the background of the Law of the Sea negotiations, pointing out how they can in substantial respect be explained as a conflict, or the culmination of a conflict which has been growing since World War II, between two competing principles of ocean management.

One is the principle of freedom of the seas, which is essentially a response to the interests of powerful maritime states and has been the controlling principle for the last 300 or 400 years.

The other is the principle of coastal state control, or the extension of the notion of territoriality for more and more purposes for greater and greater distances into the ocean.

This was what was involved in the Truman proclamation in 1945 when the United States for a special purpose extended the notion of territoriality a distance into the ocean with respect to resources of the Continental Shelf. It was what was at stake in the later move by the west coast Latin American countries proclaiming something closely approximating territorial waters for a distance of 200 miles from their coasts. And it was essentially the concern which led the United States and the Soviet Union in the late 1960's to begin an international lobbying effort aimed at bringing about a new conference on the territorial sea. These two great maritime powers were concerned that these tendencies set in train in part by the United States toward extension of territoriality for greater and greater distances into the ocean would set off a chain of events which would substantially impede the free navigability of the ocean.

You are familiar with the 1967 proposal in the United Nations by Ambassador Pardo of Malta, which came along with the efforts of the United States and the Soviet Union. That proposal was directed toward another form of ocean usage, and two efforts converged in the United Nations with the result that a comprehensive conference on the Law of the Sea, covering not just these two questions, but all uses of the ocean, and the question of protection of the marine environment as well, was eventually decided upon.

That Conference is scheduled to begin in a procedural way later this year, and in a substantive way next year.

Senator TUNNEY. Are you sanguine about the results of these conferences?

Mr. HARGROVE. In respect to the protection of the marine environment, or the foundations that will be laid for its later protection, I am afraid I am not. Perhaps I can explain why.

One needs, in explaining why, to take a brief look at what this Conference can be expected to do, as regards protection of the marine environment.

It will do a few things. If present tendencies continue, it will probably enunciate a principle of state responsibility and liability, that is, a sort of tort liability between states for damage by one state to the environment of another state. In so doing it will be responding to an instruction of the Stockholm Conference.

It will probably resolve some issues relating to the competing or concurrent authority of the coastal state and the flag state to establish standards regarding vessel pollution within an area of coastal state control extending perhaps to 200 miles.

It may well address the question of whether it is permissible under the treaty for a coastal state to declare an environmental protection zone extending well beyond its territorial waters, and perhaps to this distance of 200 miles or greater.

And in respect to the exploitation of seabed resources, it is quite conceivable that the Conference will adopt a fairly specific environmental regulatory mechanism regarding those operations and this mechanism is likely to have jurisdiction at least in the international area which will be established beyond a fairly wide zone of coastal state control.

All of these are things which need to be addressed, and in general which need to be done. But more important from the point of view of environmental protection is what the Conference seems unlikely to do if present trends continue.

It seems to me that there is little present likelihood that a treaty will establish any international regulatory authority for the protection of the marine environment generally: that is, generally from a geographic point of view, including the areas beyond national jurisdiction as well as within it, and generally from the point of view of the sources of injury to the environment, including activities that take place on land as well as activities taking place in the ocean itself, involving vessels or otherwise.

It will probably defer to the existing agency, IMCO, with respect to any regulatory authority regarding vessel pollution.

The treaties seem unlikely to lay the necessary groundwork for the creation of this kind of regulatory function in the future, by obligating states to conform their own conduct and their own regulations to such international measures as may be adopted in the future.

As to injuries to the marine environment which take place from activities on land, the treaty will very likely have little to say, aside perhaps from a very general injunction to states to do what is necessary to put an end to such activities and thereby protect the marine environment.

It is unlikely, and not surprisingly so, to create any international enforcement capacity, inasmuch as it is unlikely to create any international mechanism for creating and promulgating regulations giving rise to the question of enforcement.

Finally, I would raise the question as to what all this adds up to as concerns the risks and opportunities for protection of the marine environment which the law of the sea negotiations present. It is clear that the conflict between the two contending approaches, freedom of the seas on the one hand, and the extension of territoriality on the

other, is in danger of being resolved in the overall negotiations by a compromise which would preserve the essence of freedom of the seas; namely, free navigation, at the expense of effectively nationalizing a quite wide coastal strip, for most, if not all, important purposes.

It is not my purpose to address the wisdom of giving the coastal states control over the exploitation of living and nonliving resources out to 200 miles or out to the continental rise, nor is it my purpose to address the question of the wisdom of giving this coastal state control over other forms of activity.

I am concerned, however, with the wisdom of giving this coastal state control exclusive prerogatives with respect to environmental protection in that area, and that seems in some danger of happening in a general sense, with the exceptions which I have already indicated.

What such an outcome would mean for environmental protection of the ocean in the long run has to be assessed in the light of two facts about the sources of injury to the marine environment. The first of these facts is that we are told that the bulk of even present marine pollution, and estimates range from over 50 to 90 percent, is traceable to activities which take place on land and which produce effluents finding their way into the ocean, from rivers, from outfalls or from diffusion in the atmosphere.

Second, the area which I have said may be effectively nationalized, while by no means geographically insignificant in itself, comprising as much as a fifth of the entire area of the ocean, is nevertheless likely to be of a greatly disproportionate importance in relation to the other area of the ocean insofar as environmental protection is concerned.

The reason for this is that this is the area where the bulk of mineral exploitation takes place and where most of the living resources are to be found.

The negotiations seem to be headed toward a solution that would leave the international community in the same position, as regards the ocean environment, as it now occupies with respect to activities on land which are injurious to the land environment.

That is to say, from time to time in an ad hoc way, through the United Nations or otherwise, aroused by concern for some particular problem that has finally soaked in on the general consciousness, the community can seek to invoke the assistance of states in getting together and addressing the problem.

But it would be doing without any preexisting and continuing basis for the claim that it is really any of the international community's business what goes on in the national areas. And it would be doing so without any preexisting mechanism for doing anything about what is going on in the area, even if its legitimate concern is recognized.

This is not likely to be an effective way for protecting the interests of the United States as a member of the world community, or of that community itself in the long run, as regards the marine environment.

May I conclude then with some suggestion as to what might be introduced into the law of the sea negotiations to change the present tendency of those negotiations as regards protection of the marine environment.

In a general way it seems to me clear that it must be recognized that this new constitution for the ocean which we are in the process of formulating will not be sound or wise if the task of drawing up is

regarded as essentially one of resolving conflicts between those who are interested in maximizing territorial prerogatives, on the one hand, and those interested in maximizing another national prerogative, namely freedom of navigation, on the other. Surely the underlying concept of the negotiations must be that the whole ocean is to be treated as a genuinely common resource, and that anyone who asserts a claim of right to benefit from that common resource must comply with requirements which the community imposes on it, particularly with respect to nonabuse of the resource.

This would mean at the very least that no individual nation would be left under this treaty in the position to abuse that common resource simply because it is in fact in an advantageous position to exploit it for its own benefit.

Now, this is an approach not unknown to these negotiations. Indeed, the U.S. participation in the negotiations has from time to time invoked elements of it in proposals placed before the negotiations. Nevertheless, if such an approach is to be effectively applied even on the one issue of environmental protection, a searching review will be required.

I would suggest that the following elements will need to be introduced into drafts of a comprehensive law-of-the-sea treaty as the negotiations proceed.

First, the treaty should establish state responsibility for injury to any portion of the marine environment, whether the portion injured is under national jurisdiction or not. This responsibility should not be simply a tort relationship between states. It ought to be also a relationship between individual states and the community as a whole with respect to the world ocean.

Next, the treaty in my view should not only establish a basic obligation of states in general terms to preserve the marine environment—which, of itself, I think is a pious wish. It should lay on states an obligation to conform both their conduct and national regulations to such minimum regulatory standards as may be adopted in the future by international mechanisms.

Next, such an international regulatory mechanism should be created by the treaty, with the authority to consider all forms of threat or injury to the ocean environment from whatever sources, and to develop and adopt regulations through one or another of the established kind of regulatory competence which have been conferred on other international organizations in the past. This might be an expanded and reconstructed IMCO, and the regulatory competence conferred might be like that already proposed by the United States last week with respect to vessel pollution, but of course expanded to cover all forms of environmental injury to the ocean.

Next, I would suggest that the other international institutions that would be created by the treaty, and particularly that for management of ocean bed exploitation, should be joined in the same institution.

The treaty should clearly provide, as a means of giving teeth to dispute settlement mechanisms, that rights to use of the ocean as a whole are conditioned upon compliance with the obligation not to abuse it.

There should be effective means of suspending those rights until compliance has been restored or reparation has been made. It should

by no means be unthinkable in these negotiations that even the right of navigation should be subject to such control, to say nothing of the right of exploitation of resources, or the right to share in the proceeds of exploitation if provision for such is made.

This could be done by requiring states party to the treaty not to afford port facilities to vessels determined to be grossly in violation of their obligation. This principle has already been applied to a limited way in one of the conventions produced through IMCO. It is the 1954 oil convention, by the 1971 amendments to that convention, with respect to which the committee has legislation before it is at the present time. So the principle itself is not new. It needs to be expanded in scope and application.

These elements of the treaty would go far in my view toward establishing a base from which the international community would be able to act. Without such elements, there is a serious danger that the treaty will not only fail to provide such a base, but will so distribute jurisdiction and control over the ocean, on an essentially national basis, as to make effective action by the international community much more difficult in the future than it is even at the present time.

Senator TUNNEY. Thank you very much, Mr. Hargrove. You outlined some very important principles. Some may call them bulky, and perhaps unacceptable to the member states in the world community, but I think that you have given us a good framework which which I think all member states in the world community ought to strive to achieve.

I am myself at the moment 45 minutes late to a luncheon engagement. I did have two questions that I would like to ask you, and if you could capsule your answers, because I don't want to keep my luncheon guests waiting too long.

One, does your group have any views on the U.S. unilateral extension of its own territorial sea to protect its environment or living resources?

A bill will be introduced today by Senator Magnuson to extend U.S. territorial waters for such purposes to 200 miles.

Mr. HARGROVE. Let me first say, Senator, that my group, the American Society of International Law, does not have views, and I am not speaking for them.

But speaking for myself, from the perspectives that have been developed to some extent through the research and study activities of the society in ocean policy matters, I would say I think it would be a mistake to respond at this time in this way to the frustrations which are generating this move.

I think the way to respond at this time is internationally, through developing the policy of the U.S. Government in the law of the sea negotiations in such a way as to make more likely the kinds of international measures that will cope with the problem to which this possible unilateral extension of jurisdiction would be another form of response.

What the future will hold, one does not know, but my own judgment is that there are ways in which our own policy, which of course does not control the outcome of the negotiations but does have some impact on them, could be improved in this respect, and some of those I tried to suggest here.

Senator TUNNEY. Secondly, do you have the ability, either individually, or does your group, the society, have the ability to make a significant informational input to the American negotiators in this conference on the law of the sea?

Mr. HARGROVE. I hope so. The American Society for International Law has a number of continuing research panels covering various aspects of the negotiations including a working group on the environmental question, and another group on the question of living resources, as well as a third covering the whole range of ocean policies together.

We will certainly make an effort to be of use to the policy formulation process. Whether we are or not remains to be seen.

Senator TUNNEY. Are you or any of your associates on the Board of Advisers or serving in an advisory capacity to the American negotiators?

Mr. HARGROVE. A number of participants in the society's research and study activities are the members of the State Department's Advisory Committee on the Law of the Sea.

These are two separate capacities in which they function, but there is that connection.

Senator TUNNEY. Thank you very much, Mr. Hargrove. We appreciate your testimony today.

[The statement follows:]

STATEMENT OF JOHN LAWRENCE HARGROVE, DIRECTOR OF STUDIES, THE AMERICAN SOCIETY OF INTERNATIONAL LAW

Mr. Chairman and distinguished members of the Committee :

Let me first of all express my appreciation at having been invited to participate in this important symposium. May I note that the views which I shall express are solely my own, and are not to be attributed to the American Society of International Law, with which I am affiliated.

I should like to talk about international law and protection of the ocean environment. It is now part of our conventional wisdom that this is a timely topic, but it is instructive to ask why. There are two reasons. First, ours is an age of explosive increase in the technology of economic production, of explosive increase in human population, and of global obsession with the ideal of economic development as a way out of human misery. While human culture has always produced alterations in the near-surface portions of the planet and their life systems, both the absolute magnitude of these alterations and the rate of their increase, we are told, now dwarf those of even so recent a time as a century ago.

Now this has nothing peculiarly to do with the environment of the ocean, of course, but applies to the planet as a whole, and is what suggests to us that our planet is in or is approaching what is sometimes called an environmental crisis. What makes the question of protecting the marine environment peculiarly timely is that the world community, through the United Nations, is now engaged in a great international legislative undertaking, which will very likely result in fundamental revision of the law of ocean space. Negotiations are underway leading toward a United Nations Conference on the Law of the Sea, to begin later this year. And while this effort was not stimulated by an interest in protecting the integrity of the marine environment—far from it—it will almost surely result in important decisions about the scope of that interest within the international community, who holds responsibility for defending it, and how it shall be defended. What is going on is essentially a constitutional law-making exercise rather than one aimed at detailed regulation of the various uses of the ocean. And just by reason of this fact, together with the fact that the environmental interest has not been a dominant one in this exercise, there is a substantial risk that decisions will be taken within the next two to three years or less which will seriously slight that interest and which, more importantly, there will for the foreseeable future be no realistic prospect of undoing.

My purpose in speaking to you today is to suggest some conclusions about the substantial risks but equally substantial opportunities for protection of the ocean environment which the next two to five years will accordingly present.

It will be important to look in some detail at the background of the law-of-the-sea negotiations, their present status, and what they portend for the development of a regime for the ocean generally and for protection of the marine environment in particular. But there are also other public international forums in which protection of the marine environment is being considered in one way or another: most notably, the Intergovernmental Maritime Consultative Organization (IMCO) a United Nations Specialized Agency, and the newly established environment unit—styled the United Nations Environmental Program (UNEP)—recommended by the Stockholm Conference on the Human Environment in 1972 and created by the last United Nations General Assembly. I shall want also to comment briefly on the role of these two organizations.

The most active forum in producing regulatory regimes aimed at preventing marine pollution has been the Intergovernmental Maritime Consultative Organization (IMCO), a specialized agency of the United Nations headquartered in London. IMCO was not established initially with an environmental mandate in mind, being designed as its name implies as a forum for consultation among major shipping interests. It has, nevertheless, produced a set of treaties (the latest of which is at present in an advanced draft) which, when all in force, will deal with all forms of pollution introduced into the ocean from vessels, except one. The one exception is ocean dumping—the introduction of materials transported from land specifically for the purpose of waste disposal at sea—which is the subject of another treaty now concluded but not yet in force, generated by the preparations for the Stockholm Conference on the Human Environment.

It should be noted that this whole body of law is “regulation” only in a fairly crude sense—namely, regulation by treaty, which is cumbersome to bring into effect, and equally cumbersome to alter in response to perceived changes in need. By and large, these treaties regulate by means of laying obligations directly on states, upon whom also the responsibility for enforcement lies, leaving any change in the scheme to be proposed and considered on an ad hoc basis within IMCO, and to be brought about if at all by the treaty-amending processes.

The earliest IMCO Convention is the 1954 International Convention for the Prevention of Pollution of the Sea by Oil, since amended in 1962, 1969, and 1971. The basic effect of the Convention is to prohibit intentional discharges of oil into the sea by ships, in other than negligible amounts. Enforcement against violating vessels is left exclusively to the state of registry.

Two conventions adopted in 1969 (although not yet in force) are aimed at damage resulting from major oil pollution casualties, of which the breakup of a tanker at sea is the prime example. The convention relating to Intervention of the High Seas in Case of Oil Pollution Casualties confers a right on a state to take measures on the high seas which are necessary to protect its coasts or its related interests from pollution of the sea by oil, when there has been a casualty at sea which might reasonably be expected to result in major damaging consequences. It is limited to amelioration of pollution damage from oil. The convention on Civil Liability for Oil Pollution Damage establishes strict liability for the owner of an oil tanker from which oil has escaped into the ocean after an incident, whether that oil has caused damage in the territory or the territorial waters of a state party to the convention. Certain exceptions to strict liability—e.g., acts of war, natural catastrophes, international acts on the part of a third party—are stated. The convention establishes a limit on the liability of the shipowner, at approximately \$14 million per casualty.

A 1971 IMCO treaty, the Convention on the Establishment of an International Fund or Compensation for Oil Pollution Damage (also not yet in force) was designed to complement the 1969 Convention on Civil Liability. It provides for compensation under a special regime, which includes a fund contributed to by users of the ocean for purposes of transportation of oil by tanker, setting a limit of \$30 million, as opposed to the \$14 million limit under the 1969 convention, which imposed liability directly on shipowners. Where the requirements of the convention have been complied with, a shipowner is relieved of the additional financial burden which had been imposed by the 1969 convention. Like the 1969 convention, it does not apply to damage beyond the territorial sea.

Finally, IMCO has completed, in draft form, an International Convention on the Prevention of Pollution from Ships, which will be laid before an international conference late in 1973. The objective of the conference, as described by IMCO, is to achieve by 1975, if at all possible, but certainly by 1980, a “complete elimination of the willful and intentional pollution of the sea by oil and noxious substances other than oil, and the minimization of accidental spills.” The con-

vention is intended to cover all forms of pollution emanating from vessels, except for the dumping of wastes at sea and pollution directly arising out of exploration and exploitation of seabed mineral resources. It will extend, thus, beyond pollution from vessels by oil, to cover noxious substances other than oil, and ship-generated sewage and garbage. The draft proposes additional technical requirements regarding design, equipment and operational procedures of tankers, aimed at reducing the risk of pollution from tankers. In addition, the conference will have before it a draft of a treaty relating to Intervention on the High Seas in the Case of Pollution by Substances Other Than Oil, in the form of a protocol to the 1969 convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, which applies the principles of that convention to noxious and hazardous substances other than oil.

The 1972 convention on the Dumping of Wastes at Sea, which was not produced through IMCO, completes the collection of treaty regulation of ocean pollution by vessels as this body of international law has developed to the present time. The convention adopts the so-called black list-grey list approach to regulating the dumping of waste at sea, absolutely prohibiting the dumping of certain highly toxic substances, and allowing the dumping of certain other noxious substance only under a special regime requiring permits from the coastal state. The approach taken is the same as taken by an earlier 1972 convention adopted by a number of states bordering the North Sea and North Atlantic, the Oslo Convention for the Prevention of Marine Pollution of Dumping by Ships and Aircraft.

The United Nations Environmental Program (UNEP) also requires mention, because of its potentially important role in the devising of international measures for the protection of the marine environment. UNEP is a newly created special intergovernmental body within the United Nations, consisting of a governing council of fifty-eight member states and a secretariat headed by an Executive Director, Mr. Maurice Strong of Canada, who was the Secretary-General of the United Nations Conference on the Human Environment held in Stockholm in 1973. Its job is essentially to maintain a continuing review of the state of the global environment and of the development of policy with respect to it, to recommend or initiate policy and programs in the fields of environmental protection, and to coordinate the activities of the United Nations system as a whole with respect of the environmental protection. It has at hand the vast body of conclusions and recommendations of the Stockholm Conference, including a number relating to protection of the marine environment against land-based pollution and other injuries not clearly dealt with by the existing body of specific treaty regulation I have just discussed. But UNEP is in no sense a regulatory body. It has no competence to produce treaty law or other forms of regulatory standards, nor is it expected to have any organic connection with a new treaty on the law of the sea despite the fact that ocean matters are among its concerns. It will have an important role within the United Nations system to play with respect to any agency which does have regulatory or other operational competence, including for the time being IMCO, with which it will doubtless maintain a continuing liaison, and to which it might well make policy recommendations.

May I turn now to the main arena of action, the emerging law-of-the-sea negotiations. I have suggested that, through these negotiations, the international community is in a process of revising, perhaps radically, the principles by which ocean space has been managed. In order to understand what is at stake in this effort, we should first take a brief backward glance. Politically, the earth's surface has been organized for the last three or four hundred years on the basis of two fundamental legal principles. Like most good constitutional principles, these are so ingrained a part of our way of thinking about the order of things as to be taken quite for granted. I refer to the principle of national territoriality, by which the bulk of the earth's land surface is carved up into discrete patches subject to the political authority of the sovereign entity called a national state; and to the principle of freedom of the seas, by which the bulk of the earth's saltwater area is deemed to be under the authority of no one, and free for such uses as any may wish to put it to, subject only to noninfringement of the like rights of others. The principle of freedom of the seas was evolved by the great maritime powers of Europe, essentially as a means of coping with the fact that no one of them had the physical ability to impose its hegemony over sufficiently large portions of the open ocean to serve its own maritime interests adequately. It has dominated the ocean law and practice of the entire world for several centuries, an obvious response to the interests of powerful maritime nations in being able to navigate the ocean with a minimum of interference.

There has always, however, been a certain conflict between freedom of the seas, as a guiding principle for activities in the ocean, and national territoriality, if for no other reason than that for strategic and perhaps economic reasons, coastal states have been unwilling to grant maritime powers unimpeded across to the ocean directly off their shores. A narrow strip of the ocean surrounding the coast has thus long been regarded as legally the territory of the coastal state—that is to say, subject to the principle of national territoriality in the same way as the land area, for all purposes except certain reserved rights of navigation to and from the coastal state's ports.

You are doubtless familiar with the further tension between these two fundamental organizing principles as regards ocean space, which has developed since World War II. The first and most dramatic attack on the dominance of the notion of the freedom of the seas beyond territorial waters came, somewhat paradoxically, from a great maritime nation, in the form of the Truman Proclamation proclaiming United States sovereign rights over the resources of the continental shelf. The Truman Proclamation was stimulated primarily by the justified expectation that the continental shelf contained commercially exploitable petroleum resources. It was followed in 1952 by a move by certain West Coast Latin American Countries—Chile, Ecuador, and Peru—claiming to extend to a distance of 200 miles a national jurisdiction closely approximating complete territorial authority. Other states made claims of territorial waters beyond the three-miles traditionally recognized by the United States and other major maritime powers, and there were similar extensions of jurisdiction for limited purposes, in particular for fishing.

In 1958 and 1960, two conferences on the law of the sea convened by the United Nations undertook to codify and refine the existing law of the sea. As to the continental shelf, a convention was drawn up essentially ratifying the position taken unilaterally by the United States in the Truman Proclamation, conferring sovereign rights on the coastal state over resources of the Continental Shelf up to a limit of 200 meters, and beyond that to whatever depth permitted of exploitation of those resources. The traditional freedoms of the high seas were reaffirmed and partially listed in a convention on the high seas, which asserted, both for coastal and noncoastal states, freedom of navigation, freedom of fishing, freedom to lay submarine cables and pipelines, and freedom to fly over the high seas. The conference came very close to agreement on a maximum permissible territorial sea of six miles, but failed, largely as a result of the insistence of the United States on three miles.

Thereafter, during the 1960s, the conflict between national territoriality and freedom of the seas intensified with a gradually increasing number of unilateral extensions of national jurisdictions. The conflict was fueled, in the late sixties, by the development of new technologies, which seemed to promise commercially significant mineral development from the deep ocean floor—a possibility hardly thought of as recently as the conferences of 1958 and 1960. Similar technological development, in other areas, particularly large-scale and highly mechanized systems of harvesting of fish, and known or suspected military applications of technology for weapons or intelligence purposes, produced a similar effect. All of these burgeoning technologies tended to convince the technology-poor majority of the coastal countries of the world that perhaps legal and political moves were required to prevent preemptive exploitation of "their" parts of the ocean by the technologically rich. At the same time, developed countries were stimulated to look on the ocean from the perspective of a richer complex of interests than had been the case when navigation, fishing, and strategic security were their only major ocean concerns.

In the late 1960s, the United States and the Soviet Union began extensive diplomatic efforts aimed at a new conference on the territorial sea. The underlying premise of this effort was that there should be a treaty agreeing on a twelve-mile territorial sea, accompanied by guarantees of free passage through those international straits which would be enclosed by such an extension of the territorial sea from three to twelve miles, and by preferential rights for coastal fishing states in return for the willingness of these states to forego more extensive claims of territorial seas.

Almost simultaneously, an initiative was taken in the United Nations by Ambassador Pardo of Malta, largely stimulated by the perceived need to devise international means of regulating the mineral resources of the deep sea-bed in the interest of all mankind. The two initiatives merged, and the ensuing discussions eventually produced a decision in the United Nations General Assembly to hold a comprehensive conference on the law of the sea, at which much, if not

all, of the fundamental law of ocean space would be reexamined and possibly renegotiated and revised. This conference is now scheduled to begin formally late in 1973; in fact, however, if not in form, it has already been underway for several years.

A look at some of the major features of these negotiations, as they have developed until now, with particular attention to the role of the United States, will be helpful.

The issue of the breadth of the territorial sea, and the important preliminary question whether a limit on that breadth should be agreed internationally by means of a new treaty, were the prime factors in the development of interest on the part of the United States Government in new negotiations on the law of the sea. They remain a preoccupying consideration—a preoccupation which is, of course, only a part of the legitimate concern of the United States for freedom of navigation in the whole ocean. It now appears likely that, in a final treaty, this one issue might well be resolved in favor of the position originally put forth by the United States and the Soviet Union—that is to say, a territorial sea of 12 miles. Such a solution presupposes, however, that an arrangement acceptable to the major maritime powers will have been worked out adequately protecting freedom of navigation through international straits which would be newly enclosed by extending territorial waters to 12 miles. No such arrangement clearly acceptable to all seems yet to have emerged.

Moreover, if present indications continue, it seems increasingly likely that agreement on a 12-mile territorial sea will be achieved only at the cost of ceding to coastal states very extensive prerogatives in a wide coastal band—perhaps 200 miles or more. Substantial numbers of states now insist that these prerogatives should include ownership of, and the exclusive right to exploit and profit from, the living and nonliving resources of the area, and the right to regulate and control all or virtually all other activities for all purposes including environmental protection, subject only to the reserved freedom of navigation and overflight (and perhaps other, less consequential reserved freedoms) which all states would enjoy. As expounded by considerable numbers of developing countries, this exclusive economic resource zone would amount to an effective extension of national territory 200 miles into the ocean, with an exception carved out for the right of navigation. The major competitor of this position, as regards this intermediate area of 200 miles or so, is probably the United States concept of a “trusteeship zone,” embodied in a draft treaty put forward in 1970. The trusteeship zone would in practical fact resemble an exclusive economic resource zone in many respects, but in important particulars would differ: the coastal state, as “trustee” for the international community, would have the exclusive right to manage and control exploitation. In so doing, it would lay down and enforce measures of environmental protection. It would take a large share of the proceeds of exploitation, but a designated portion would be dedicated to international community purposes, including the administrative costs of an ocean management machinery. The United States trusteeship zone concept would apply to mineral resource exploitation (as would the ocean management institutions and the environmental protection devices envisaged in its proposal). The trusteeship area would be regarded as a part of an “international” area, which would include the remainder of the open ocean as well. As regards environmental protection, the United States proposal envisages an international apparatus establishing detailed protection standards for seabed exploitation operations, which would be applicable in the trustee zone as well as outside it. National regulations could not be less exacting than the international ones, and enforcement would be the prerogative of the coastal state.

As the negotiations proceed, there will be pressure on the United States to move increasingly closer to the exclusive economic resource zone concept of many coastal developing countries, dropping or diluting various international features of its original “trusteeship zone,” in return for assurances of acceptably unimpeded navigation throughout the whole ocean outside territorial waters, and through international straits. Indeed, this has already happened to some extent. The only substantial bloc of countries involved in the negotiation having a professed stake in retention of significant international features for a seabed mineral exploitation regime are the landlocked and “shelf locked” countries, whose only direct commercial return from seabed mineral exploitation is likely to be in the form of a portion of proceeds paid to an international community fund.

Now where does the problem of protecting the ocean's environmental fit into all this? It is an issue before the conference, in the sense that it has carried on the list of possible issues with which the preparatory committee for the conference is

attempting to deal, has been referred to one of three subcommittees of that group along with the question of arrangements for scientific research in the oceans. It has been overshadowed, however, by the issues of navigation, commercial exploitation of fish and minerals, and territorial rights—those great economic and strategic concerns for putting the ocean to use in one's own national interest which engendered the negotiations in the first place. Only recently has this subcommittee begun to discuss the possible shape of articles on environmental protection which might be included in a law of the sea treaty. While it is too early to predict what those articles might eventually be, one can hazard an educated guess as to what sort of things they will attempt to do in respect of environmental protection if the discussions continue on their present course:

The treaty may well establish a quite generally stated obligation on the part of the states to protect the marine environment, as well as to cooperate in the development of multilateral efforts toward this end in the future.

It may well confer on an international mechanism established to manage the exploitation of seabed resources beyond the zone of national control the authority to establish environmental protection regulations with respect to exploitation activities. It may give this mechanism the authority to establish minimum standards applicable in an exclusive economic resource zone or other area in which mineral exploitation is under the management of the coastal state.

It will probably address questions of the scope and content of the authority of the coastal state with respect to environmental regulation off its own coasts. One such question is the establishment of standards relating to pollution from vessels within a coastal zone, and the relationship between this coastal state authority and the traditional authority of the flag state or state of registry of the vessel with respect to the establishment and enforcement of such standards. It may well address the question of conferring other prerogatives on the coastal state—such as the right to establish an exclusive environmental protection zone (perhaps as a part of an exclusive economic resource zone). And it may well make special provisions for the rights of coastal states that are adjacent to straits, as regards the environmental protection measures with which vessels navigating those straits must comply.

(4) The law-of-the-sea treaty may well enunciate a general principle of state responsibility and liability for injury to the marine environment of other states, thus turning into treaty law the general principle included in the Stockholm Declaration of Principles on the Human Environment, to the effect that states have "the responsibility to ensure that activities within their jurisdiction are controlled and do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction." (It is now considerably more doubtful that a law of the sea treaty would raise to the level of treaty obligation the principle of responsibility for injury to the marine environment beyond the limits of the national jurisdiction of any state, despite the obvious importance of this principle.)

More important than what a law of the sea conference now seems likely to do for the environment is what it seems *unlikely* to do, if present trends continue:

(1) There is little present likelihood that a treaty will establish any international regulatory authority for the protection of the marine environment generally. Rather, if it creates any international regulatory function at all, that function will probably be limited to only part of the ocean—the open ocean beyond the coastal state's resource zone, and possibly that zone itself in some limited degree. It will probably be similarly restricted to only one form of activity—exploitation of mineral resources. It is likely to defer, explicitly or by implication, to IMCO as the focus for such international regulatory authority as may exist for other forms of ocean pollution, in particular pollution from vessels.

(2) Nor is it likely to lay the necessary groundwork, in this constitutional law of the oceans, for effective exercises such as international regulatory function in the future, by obligating states to conform their own regulations as well as their own conduct to international regulations promulgated. In any event, such a provision is of questionable value if no mechanism authorized to develop such regulations in the future is simultaneously created.

(3) As to injuries to the marine environment from activities which take place on land, the law-of-the-sea treaty will probably have little to say, aside perhaps from enjoining states in general terms to take measures designed to prevent such threats, which should take into account any international guidelines which may be developed.

(4) Unlikely to create any international regulatory authority, the treaty appears also unlikely to create any international enforcement capacity, such as the power to inspect activities to determine compliance, to investigate complaints, to compel determination of complaints, or to deprive violators of treaty obligations of benefits under the treaty regime. There may be an exception as to seabed exploitation activities in the area beyond the zone of coastal state control.

What does all this add up to, as concerns the risks and opportunities for protection of the environment of the ocean which the law-of-the-sea negotiations present? At the outset, I called attention to the historic conflict, in the development of ocean law and practice, between the principle of freedom of the seas and the principle of national territoriality, recalling how, in the generation since World War II, there had been growing pressure to extend the concept of national territory in whole or in part farther and farther into the open ocean. The Canadian legislation unilaterally claiming jurisdiction over wide coastal area for environmental purposes is only a further and recent example.

It is clear that the conflict between these two contending approaches continues in the present negotiations. There is an equally clear danger that it will be resolved by a compromise which would preserve the essence of the traditional freedom of the seas—namely, free navigation—while effectively nationalizing a wide coastal strip for most, if not all, other important purposes. That is to say, as I have already indicated, it would turn a coastal strip of perhaps 200 miles into something very closely approximating national territory for a very wide range of purposes, including exploitation of all resources, and regulation respecting all or most forms of environmental threats.

Now, I am not at present concerned with the merits of the question whether this coastal area should be thus “nationalized” for purposes of economic exploitation or other purposes. I am concerned with environmental protection, and what such an outcome would mean for environmental protection must be assessed in light of two facts about the sources of injury to the marine environment: first, the fact that the bulk of marine pollution—estimates range from over 50 to 90 percent—we are now told is traceable to activities taking place on land and producing effluents which enter the ocean through runoff in rivers, direct introduction into the ocean from land, or diffusion into the atmosphere. Second, the area which may be effectively nationalized, while by no means geographically insignificant (amounting to perhaps as much as one-fifth of the area of the entire ocean) is, nevertheless, likely to be of a greatly disproportionate importance insofar as injury to the marine environment is concerned. For it is in this area that the bulk of mineral exploitation activities will take place for the time being. And it is in this area that the greatest potential for harm exists, not only for the obvious reason of its adjacency to the coasts, but also because it contains the bulk of the commercially exploitable living resources of the ocean.

As to this “nationalized” area, the treaty may leave the international community in approximately the same position, insofar as concerns protecting the community interest in the marine environment, as it now occupies with respect to activities on land which are injurious to the land environment. That is to say, the international community can, on an ad hoc basis, from time to time, through the United Nations or some other international agency, seek to get states to come together to cope with particular problems as they arise. But it must do so without any preexisting and continuing basis for the claim that it is really any of the international community’s business what injuries are being inflicted on the environment within this area, since the area is essentially national in character. And it must do so without any preexisting mechanism for doing anything about those injuries even if its legitimate concern is recognized.

The effectiveness with which any interest of the world community as a whole in maintaining the environment may be protected from such a position can be surmised by recalling only one sentence from the Declaration of Principles on the Human Environment adopted by the Stockholm Conference. The very sentence of that Declaration which proclaims the responsibility of states to ensure that activities in their jurisdiction do not damage the environment of other states or the areas beyond national jurisdiction, proclaims also that states have “the sovereign right to exploit their own resources pursuant to their own environmental policies.” This now famous qualifier, which might reasonably be taken to negate the other half of the proposition of which it is a part, was but one particularly clear expression of the view of many countries that what goes on within national territory is really no business of the international community,

regardless of the injuries it may inflict on the environment, beyond vague statements of concern and general obligation. And what we are confronted with in the present law-of-the-sea negotiations is the danger that this principle will be effectively established at a constitutional level, both for activities taking place on land which are injurious to the ocean environment, and for activities taking place within the one-fifth or so of the ocean area where the great bulk of the potentially injurious activities are likely to take place in the foreseeable future.

What is required in order to forestall this unhappy eventuality? What should happen in the law of the sea negotiations, and what should the United States, as a participant in those negotiations, do?

First, I suggest, it should be clearly recognized that a new constitution for the ocean will not be sound or wise if the task of drawing it up is regarded as essentially one of the resolving conflicts between those nations interested in maximizing national territorial prerogatives in the oceans, and those interested in preserving freedom of the seas to the maximum extent possible. Both of these approaches, whatever may have been their historical role, are essentially individualistic in *laissez-faire*. They leave each member of the international community free to try to expand its own share of the benefits of a common resource without the restraint of community regulation designed to prevent abuse of that resource, the only proviso being that its efforts must not injure any other member in the exercise of a similar right of unregulated self-aggrandizement. Surely what is needed, instead, is that we be farsighted enough to deal with the whole ocean as a genuinely common resource of mankind. Negotiations should proceed from the premise that no individual member of the community can assert a claim of right to enjoy the benefits of a community resource except pursuant to arrangements which that community has sanctioned. And this would mean, at the very least, that no individual nation has the right to harm that common resource simply because it is in the fact in an advantageous position geographically, geologically, or technologically, to exploit it for its own benefit. Rather, the community itself can exact compliance with standards designed to protect the resource itself, in this case the world ocean, from injury.

Such an approach is not unknown to the law-of-the-sea negotiations as they have developed thus far. Indeed, the United States incorporated elements of it in its initial proposal for an international regime governing exploitation of the deep seabed. It underlies a comprehensive proposal for an ocean regime put forward by Malta. But if this approach is to be effectively applied, even on the one issue of environmental protection, a fairly searching review and revision of the general thrust of the negotiations will be required.

More particularly, I would suggest the following elements, which very probably should be included in a law of the sea treaty emerging from the present negotiations: (1) The treaty should establish state responsibility for injury to any portion of the marine environment, whether within national jurisdiction or not.

(2) The treaty should not only establish a basic obligation of states with respect of the preservation of marine environment (which is, without more, a pious wish), but should lay on them an obligation to conform both their conduct and their own national regulation to such minimum regulatory standards as may be adopted through an international mechanism.

(3) Such an international regulatory mechanism should be created, with the authority to consider all forms of threat or injury to the ocean environment from whatever source, and to develop and adopt regulations through one or another of the established and familiar kinds of regulatory competence which have been conferred on other international organizations in technical fields in the past. As a practical matter, this agency might well be a thoroughly reconstituted and expanded IMCO. Its regulatory competence might well be like that already proposed by the United States for IMCO with respect to vessel pollution, but expanded to cover all forms of environmental injury to the ocean.

(4) Other international institutional functions now being developed with respect to ocean management should be joined in this same institution. These would include management of the exploitation of seabed resources, and effective methods of settling disputes among nations, and between nations and the international community authority, with respect to fulfillment of treaty obligations.

(5) The treaty should clearly provide, as a means of giving teeth to any such dispute settlement mechanisms, that the rights of use of the ocean as a whole are conditioned upon compliance with the obligations not to abuse it.

It should therefore devise effective means of suspending those rights after due determination of any such abuse, until compliance has been restored or reparation made. It is by no means unthinkable to consider making even the right of navigation subject to such control, through, for example, requiring states parties not to afford port facilities to the vessels of states determined to be grossly in violation of their obligation not to abuse the common resource. (Indeed, this principle has already been applied in a limited way in the case of compliance by tankers with regulations contained in the 1971 amendments to the 1954 Oil Pollution Convention.)

These elements of a treaty would go far toward establishing a tenable base from which the international community could act effectively in due course to protect the marine environment. Without them, there is a serious danger that the treaty will not only fail to provide such a base, but will so distribute jurisdiction and control over the ocean as to make effective action much more difficult in the future even than is the case now.

Senator TUNNEY. The committee will recess now until 9:30 a.m., June 19, when hearings will resume here in room 5110.

[Whereupon, at 1:05 p.m., the committee recessed, to reconvene at 9:30 a.m., Tuesday, June 19, 1973.]

OCEAN POLLUTION

THURSDAY, JUNE 28, 1973

U.S. SENATE,
COMMITTEE ON COMMERCE,
SUBCOMMITTEE ON OCEANS AND ATMOSPHERE,
Washington, D.C.

The subcommittee met at 10:05 a.m. in room 5110, Dirksen Senate Office Building, Hon. Ernest F. Hollings (chairman of the subcommittee) presiding.

OPENING STATEMENT BY SENATOR HOLLINGS

Senator HOLLINGS. Good morning. The committee will please come to order.

Two weeks ago this subcommittee heard from a number of distinguished scientists on the environmental conditions in the world oceans. They have collectively made a case showing clearly that pollution of the oceans is a serious problem of national and international significance.

This morning witnesses will be discussing two pieces of legislation which seek to eliminate or reduce the total amount of polluting matter reaching the ocean.

S. 1067 and S. 1070 would implement international agreements drawn to minimize contamination by oil discharged either accidentally or intentionally from ships.

S. 1067 would bring domestic law into line with the 1969 and 1971 amendments to the 1954 IMCO Convention on the Prevention of Pollution of the Sea by Oil. The changes made in 1969 tighten existing control measures with respect to the deliberate discharge of oily wastes into the sea.

In 1971 IMCO recommended two additional amendments. The first would treat the Great Barrier Reef as land for the purpose of drawing lines for prohibited discharge zones. The second amendment establishes a limitation for tank sizes in new vessels so as to minimize the outflow of oil in the event of a collision or grounding. S. 1067 would implement both of those amendments.

S. 1070 provides for the domestic implementation of the intervention convention. Under this act, the Coast Guard is given the authority to take action on the high seas in the event of a maritime accident involving oil.

IMCO has just recently completed the draft of a totally new comprehensive treaty of marine pollution from ships. That draft will be the subject of a month-long conference in London during October of this year.

To bring this subcommittee up to speed on this proposed convention, we have asked some of the witnesses to relate their testimony on S. 1067 and S. 1070 to the proposed new treaty. I assume that Senators representing the Commerce Committee will be participating in the conference in October.

A third bill, S. 1351, which amends the Marine Protection, Research and Sanctuaries Act of 1972, Public Law 92-532, to implement the provisions of the convention on ocean dumping entered into just last year will be discussed briefly today. The convention itself has not received ratification by the Senate but is now being considered by the Senate Foreign Relations Committee.

Several changes are needed to make our national ocean dumping law compatible with our responsibilities under the international convention. Further hearing will be held later on S. 1351.

[The bills and agency comments follow:]

93^d CONGRESS
1ST SESSION

S. 1067

IN THE SENATE OF THE UNITED STATES

MARCH 1, 1973

Mr. MAGNUSON (for himself and Mr. COTTON) (by request) introduced the following bill; which was read twice and referred to the Committee on Commerce

A BILL

To amend the Oil Pollution Act, 1961 (75 Stat. 402), as amended, to implement the 1969 and the 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended; and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the Oil Pollution Act Amend-
4 ments of 1973.

5 SEC. 2. The Oil Pollution Act, 1961 (75 Stat. 402),
6 as amended (33 U.S.C. 1001-1015), is amended as follows:

7 (1) Section 2 (33 U.S.C. 1001) is amended—

II

2

1 (A) by redesignating subsections (c), (d), (e)
2 and (f), as subsections (d), (e), (f), and (g), re-
3 spectively;

4 (B) by adding a new subsection (c) to read “(c)
5 The term ‘instantaneous rate of discharge of oil con-
6 tent’ means the rate of discharge of oil in liters per hour
7 at any instant divided by the speed of the ship in knots
8 at the same instant;”;

9 (C) in subsection (c) (redesignated (d) by sub-
10 paragraph (A) of this paragraph) :

11 (1) by deleting the word “marine”; and

12 (2) by deleting the figure “D-86/59” at the
13 end of the sentence and inserting in lieu thereof the
14 phrase “D.86-71 or any later revisions subject to
15 regulatory acceptance by the Coast Guard”;

16 (D) in subsection (e) (redesignated (f) by sub-
17 paragraph (A) of this paragraph) by changing the
18 period to a semicolon at the end of the first sentence
19 thereof and by amending the second sentence to read
20 “an ‘oily mixture’ means a mixture with any oil
21 content;”;

22 (E) by repealing subsection (g) ;

23 (F) by amending subsection (h) to read “The
24 term ‘Secretary’ means the Secretary of the department
25 in which the Coast Guard is operating;”;

3

1 (G) in subsection (j) by changing the period to a
2 semicolon and by adding the following to the sentence:

3 “except that, for the purpose of this Act ‘from the near-
4 est land’ off the northeastern coast of Australia means a line
5 drawn from a point on the coast of Australia in latitude 11
6 degrees south, longitude 142 degrees 08 minutes east to a
7 point in latitude 10 degrees 35 minutes south, longitude 141
8 degrees 55 minutes east—

9 “thence to a point latitude 10 degrees 00 minutes south,
10 longitude 142 degrees 00 minutes east

11 “thence to a point latitude 9 degrees 10 minutes south,
12 longitude 143 degrees 52 minutes east

13 “thence to a point latitude 9 degrees 00 minutes south,
14 longitude 144 degrees 30 minutes east

15 “thence to a point latitude 13 degrees 00 minutes south,
16 longitude 144 degrees 00 minutes east

17 “thence to a point latitude 15 degrees 00 minutes south,
18 longitude 146 degrees 00 minutes east

19 “thence to a point latitude 18 degrees 00 minutes south,
20 longitude 147 degrees 00 minutes east

21 “thence to a point latitude 21 degrees 00 minutes south,
22 longitude 153 degrees 00 minutes east

23 “thence to a point on the coast of Australia in latitude
24 24 degrees 42 minutes south, longitude 153 degrees 15
25 minutes east.”

4

1 (2) Section 3 (33 U.S.C. 1002) is amended to read as
2 follows:

3 “SEC. 3. Subject to the provisions of sections 4 and 5,
4 the discharge of oil or oily mixture from a ship is prohibited
5 unless—

6 “(a) the ship is proceeding en route; and

7 “(b) the instantaneous rate of discharge of oil
8 content does not exceed sixty liters per mile, and

9 “(c) (1) for a ship, other than a tanker—

10 “(i) the oil content of the discharge is less than
11 one hundred parts per one million parts of the mix-
12 ture, and

13 “(ii) the discharge is made as far as practicable
14 from land;

15 “(2) for a tanker, except discharges from ma-
16 chinery space bilges which shall be governed by the
17 above provisions for ships other than tankers—

18 “(i) the total quantity of oil discharged on a
19 ballast voyage does not exceed one fifteen-thou-
20 sandths of the total cargo-carrying capacity, and

21 “(ii) the tanker is more than fifty miles from
22 the nearest land.”.

23 (3) Section 4 (33 U.S.C. 1003) is amended—

24 (A) by changing the word “shall” to “does” in
25 the introductory clause thereof;

5

1 (B) by changing the semicolon to a period at the
2 end of subsection (b) thereof; and

3 (C) by repealing subsection (c) thereof.

4 (4) Section 5 (33 U.S.C. 1004) is amended to read
5 as follows:

6 "SEC. 5. Section 3 does not apply to the discharge of
7 tanker ballast from a cargo tank which, since the cargo was
8 last carried therein, has been so cleaned that any effluent
9 therefrom, if it were discharged from a stationary tanker into
10 clean calm water on a clear day, would produce no visible
11 traces of oil on the surface of the water."

12 (5) Insert a new section 6, to read as follows, follow-
13 ing section 5:

14 "SEC. 6. (a) Every tanker to which this Act applies
15 and built in the United States and for which the building
16 contract is placed on or after the effective date of this sec-
17 tion shall be constructed in accordance with the provisions
18 of Annex C to the convention, relating to tank arrangement
19 and limitation of tank size.

20 "(b) Every tanker to which this Act applies and built
21 in the United States and for which the building contract is
22 placed, or in the absence of a building contract the keel of
23 which is laid or which is at a similar state of construction,
24 before the effective date of this section, shall, within two-

6

1 years after that date, comply with the provisions of Annex C
2 to the convention if—

3 “(1) the delivery of the tanker is after January 1,
4 1977; or

5 “(2) the delivery of the tanker is not later than
6 January 1, 1977, and the building contract is placed
7 after January 1, 1972, or in cases where no building
8 contract has previously been placed, the keel is laid or
9 the tanker is at a similar stage of construction, after
10 June 30, 1972.

11 “(c) A tanker required under this section to be con-
12 structed in accordance with Annex C to the convention
13 and so constructed shall carry on board a certificate issued
14 by the Secretary attesting to that compliance. A tanker
15 which is not required to be constructed in accordance with
16 Annex C to the convention shall carry on board a certificate
17 to that effect issued by the Secretary, or if a tanker does
18 comply with Annex C though not required to do so, she may
19 carry on board a certificate issued by the Secretary attest-
20 ing to that compliance. Tankers under the flag of the United
21 States are prohibited from engaging in domestic or foreign
22 trade without an appropriate certificate issued under this
23 section.

24 “(d) Certificates issued to foreign tankers pursuant to
25 the convention by other nations party thereto shall be

1 accepted by the Secretary as of the same force as certificates
2 issued by him. If the Secretary has clear grounds for believ-
3 ing that a foreign tanker required under the convention to be
4 constructed in accordance with Annex C entering ports of
5 the United States or using off-shore terminals under United
6 States control does not in fact comply with Annex C, he may
7 request the Secretary of State to seek consultation with the
8 government with which the tanker is registered. If after con-
9 sultation or otherwise, the Secretary is satisfied that such
10 tanker does not comply with Annex C, he may for this
11 reason deny such tanker access to ports of the United States
12 or to off-shore terminals under United States control until
13 such time as he is satisfied that the tanker has been brought
14 into compliance.

15 “(e) If the Secretary is satisfied that any other foreign
16 tanker which, if registered in a country party to the conven-
17 tion, would be required to be constructed in accordance with
18 Annex C, does not in fact comply with the standards relating
19 to tank arrangement and limitation of tank size of Annex C,
20 then he may deny such tanker access to ports of the United
21 States or to off-shore terminals under United States control.”

22 (6) Section 6 (33 U.S.C. 1005) is renumbered section
23 7 and is amended to read as follows:

24 “SEC. 7. (a) Any person who willfully discharges oil
25 or oily mixture from a ship in violation of this Act or the

1 regulations thereunder shall be fined not more than \$10,000
2 for each violation or imprisoned not more than one year, or
3 both.

4 “(b) In addition to any other penalty prescribed by law
5 any person who willfully or negligently discharges oil or oily
6 mixture from a ship in violation of this Act or any regula-
7 tion thereunder shall be liable to a civil penalty of not more
8 than \$10,000 for each violation and any person who other-
9 wise violates this Act or any regulation thereunder shall be
10 liable to a civil penalty of not more than \$5,000 for each
11 violation.

12 “(c) A ship from which oil or oily mixture is dis-
13 charged in violation of this Act or any regulation thereunder
14 is liable for any pecuniary penalty under this section and
15 may be proceeded against in the district court of any district
16 in which the vessel may be found.

17 “(d) The Secretary may assess any civil penalty in-
18 curred under this Act or any regulation thereunder and, in
19 his discretion, remit, mitigate, or compromise any penalty.
20 No penalty may be assessed unless the alleged violator
21 shall have been given notice and the opportunity to be heard
22 on the alleged violation. Upon any failure to pay a civil
23 penalty assessed under this Act, the Secretary may request
24 the Attorney General to institute a civil action to collect the
25 penalty. In hearing such action, the district court shall have

9

1 authority to review the violation and the assessment of the
2 civil penalty de novo.”

3 (7) Section 7 is renumbered section 8.

4 (8) Section 8 (33 U.S.C. 1007) is renumbered section
5 9 and is amended—

6 (A) in subsection (a) by amending the first sen-
7 tence to read as follows: “In the administration of sec-
8 tions 1–12 of this Act, the Secretary may utilize by
9 agreement, with or without reimbursement, law enforce-
10 ment officers or other personnel, facilities, or equipment of
11 other Federal agencies or the States.”;

12 (B) in subsection (a) by amending the first part
13 of the second sentence which precedes the first use of
14 the word “shall” to read: “For the better enforcement of
15 the provisions of said sections, officers of the Coast Guard
16 and other persons employed by or acting under the au-
17 thority of the Secretary”;

18 (C) in subsection (a) by deleting from the last
19 sentence thereof the words “and of the Bureau of Cus-
20 toms” and the words “in a prohibited zone or in a port
21 of the United States”; and

22 (D) in subsection (b) by deleting in the first sen-
23 tence thereof the words “of the Department in which the
24 Coast Guard is operating” and by deleting the second
25 sentence thereof in its entirety.

1 (9) Section 9 (33 U.S.C. 1008) is renumbered section
2 10 and is amended—

3 (A) by amending subsection (c) to read as follows:

4 “(c) The oil record book shall be completed on each
5 occasion, on a tank-to-tank basis, whenever any of the follow-
6 ing operations takes place in the ship—

7 “(1) for tankers:

8 “(i) loading of oil cargo;

9 “(ii) transfer of oil cargo during voyage;

10 “(iii) discharge of oil cargo;

11 “(iv) ballasting of cargo tanks;

12 “(v) cleaning of cargo tanks;

13 “(vi) discharge of dirty ballast;

14 “(vii) discharge of water from slop tanks;

15 “(viii) disposal of residues;

16 “(ix) discharge overboard of bilge water con-
17 taining oil which has accumulated in machinery
18 spaces while in port, and the routine discharge at
19 sea of bilge water containing oil unless the latter has
20 been entered in the appropriate log book;

21 “(2) for ships other than tankers:

22 “(i) ballasting or cleaning of bunker fuel tanks;

23 “(ii) discharge of dirty ballast or cleaning
24 water from bunker fuel tanks;

25 “(iii) disposal of residues;

1 “(iv) discharge overboard of bilge water con-
2 taining oil which has accumulated in machinery
3 spaces while in port, and the routine discharge at
4 sea of bilge water containing oil unless the latter
5 has been entered in the appropriate log book. In
6 the event of such discharge or escape of oil or oily
7 mixture as is referred to in section 4 of this Act,
8 a statement shall be made in the oil record book of
9 the circumstances of, and reason for, the discharge
10 or escape.”;

11 (B) by changing the figure “9” in subsection (d)
12 to read “10”; and

13 (C) by repealing subsection (f) .

14 (10) Section 10 (33 U.S.C. 1009) is renumbered sec-
15 tion 11 and is amended to make the sectional enumeration
16 read as follows: “Sections 3, 4, 5, 6, 7, 9, and 10.”

17 (11) Section 11 is renumbered section 12 and is
18 amended by deleting the words “any prohibited zone” in
19 subsection (b) thereof and by substituting therefor the
20 words “violation of the convention but outside the territorial
21 sea of the United States”.

22 (12) Section 12 (33 U.S.C. 1011) is repealed.

23 (13) Sections 14 and 15 are renumbered sections 13 and
24 14, respectively.

1 (14) Section 16 (33 U.S.C. 1014) is renumbered
2 section 15 and is amended by adding between the words
3 “provisions of” and the word “the” the words “section 311
4 of”, and by deleting the words “Oil Pollution Act, 1924,”
5 and substituting therefor the words “Federal Water Pollution
6 Control Act,”.

7 (15) Section 17 (33 U.S.C. 1015) is repealed.

8 SEC. 3. (a) Except as provided in subsection (c) of
9 this section, this amending Act is effective upon the date of
10 its enactment or upon the date amendments to the Inter-
11 national Convention for the Prevention of the Pollution of
12 the Sea by Oil, 1954, as amended, adopted by the Assembly
13 of the Inter-Governmental Maritime Consultative Organiza-
14 tion on October 21, 1969, October 12, 1971, and October 15,
15 1971, are ratified or accepted with the advice and consent
16 of the Senate of the United States, whichever is the later
17 date.

18 (b) Any rights or liabilities existing on the effective
19 date of this Act shall not be affected by the enactment of
20 this Act. Any regulations or procedures promulgated or
21 effected pursuant to the Oil Pollution Act, 1961, as pre-
22 viously amended, remain in effect until modified or super-
23 ceded under the authority of the Oil Pollution Act, 1961, as
24 amended by this Act. Any reference to the International
25 Convention for the Prevention of the Pollution of the Sea

1 by Oil, 1954, in any law or regulation shall be deemed to
2 be a reference to the convention as revised or amended by
3 the latest amendments in respect of which the United States
4 has deposited an instrument of ratification or acceptance.

5 (c) Notwithstanding the foregoing provisions of this
6 section, subsections (d) and (e) of section 6 of the Oil
7 Pollution Act, 1961, as amended by section 2 of this bill,
8 shall be effective upon the date of their enactment or upon
9 the date the International Convention for the Prevention of
10 Pollution of the Sea by Oil, 1954, as amended by the amend-
11 ments adopted by the Assembly of the Inter-Governmental
12 Maritime Consultative Organization on October 15, 1971,
13 enters into force pursuant to article XVI of that convention
14 as amended, whichever is later; and no authority shall be
15 exercised pursuant to article VI bis (3) and (4) of such
16 amendments prior to the effective date of such subsections.

93^d CONGRESS
1ST SESSION

S. 1070

IN THE SENATE OF THE UNITED STATES

MARCH 1, 1973

Mr. MAGNUSON (for himself and Mr. COTTON) (by request) introduced the following bill; which was read twice and referred to the Committee on Commerce

A BILL

To implement the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "Intervention on the High
4 Seas Act".

5 SEC. 2. As used in this Act—

6 (1) "ship" means—

7 (A) any seagoing vessel of any type whatso-
8 ever, and

9 (B) any floating craft, except an installation or
10 device engaged in the exploration and exploitation

1 of the resources of the seabed and the ocean floor
2 and the subsoil thereof;

3 (2) "oil" means crude oil, fuel oil, diesel oil, and
4 lubricating oil;

5 (3) "convention" means the International Conven-
6 tion Relating to Intervention on the High Seas in Cases
7 of Oil Pollution Casualties, 1969;

8 (4) "Secretary" means the Secretary of the depart-
9 ment in which the Coast Guard is operating; and

10 (5) "United States" means the States, the District
11 of Columbia, the Commonwealth of Puerto Rico, the
12 Canal Zone, Guam, American Samoa, the Virgin Islands,
13 and the Trust Territory of the Pacific Islands.

14 SEC. 3. Whenever a ship collision, stranding, or other
15 incident of navigation, or other occurrence on board a ship
16 or external to it resulting in material damage or imminent
17 threat of material damage to the ship or her cargo creates,
18 as determined by the Secretary, a grave and imminent
19 danger to the coastline or related interests of the United
20 States from pollution or threat of pollution of the sea by
21 oil which may reasonably be expected to result in major
22 harmful consequences, the Secretary may, except as pro-
23 vided for in section 10, without liability for any damage
24 to the owners or operators of the ship, to her cargo or
25 crew, or to underwriters or other parties interested therein,

1 take measures on the high seas, in accordance with the
2 provisions of the Convention and this Act, to prevent,
3 mitigate, or eliminate that danger.

4 SEC. 4. In determining whether there is grave and
5 imminent danger of major harmful consequences to the
6 coastline or related interests of the United States, the Secre-
7 tary shall consider the interests of the United States directly
8 threatened or affected including but not limited to, fish,
9 shellfish, and other living marine resources, wildlife, coastal
10 zone and estuarine activities, and public and private shore-
11 lines and beaches.

12 SEC. 5. Upon a determination under section 3 of this Act
13 of a grave and imminent danger to the coastline or related
14 interests of the United States, the Secretary may—

15 (1) coordinate and direct all public and private
16 efforts directed at the removal or elimination of the
17 threatened pollution damage;

18 (2) directly or indirectly undertake the whole or
19 any part of any salvage or other action he could require
20 or direct under subsection (1) of this section; and

21 (3) remove, and, if necessary, destroy the ship and
22 cargo which is the source of the danger.

23 SEC. 6. Before taking any measure under section 5 of
24 this Act, the Secretary shall—

25 (1) consult, through the Secretary of State, with

1 other countries affected by the marine casualty, and
2 particularly with the flag country of any ship involved;

3 (2) notify without delay the Administrator of the
4 Environmental Protection Agency and any other per-
5 sons known to the Secretary, or of whom he later be-
6 comes aware, who have interests which can reasonably
7 be expected to be affected by any proposed measures;
8 and

9 (3) consider any views submitted in response to the
10 consultation or notification required by subsections (1)
11 and (2) of this section.

12 SEC. 7. In cases of extreme urgency requiring measures
13 to be taken immediately, the Secretary may take those meas-
14 ures rendered necessary by the urgency of the situation with-
15 out the prior consultation or notification as required by sec-
16 tion 6 of this Act or without the continuation of consulta-
17 tions already begun.

18 SEC. 8. (a) Measures directed or conducted under this
19 Act shall be proportionate to the damage, actual or threat-
20 ened, to the coastline or related interests of the United States
21 and may not go beyond what is reasonably necessary to pre-
22 vent, mitigate, or eliminate that damage.

23 (b) In considering whether measures are proportionate
24 to the damage the Secretary shall, among other things,
25 consider—

5

1 (1) the extent and probability of imminent damage
2 if those measures are not taken;

3 (2) the likelihood of effectiveness of those meas-
4 ures; and

5 (3) the extent of the damage which may be caused
6 by those measures.

7 SEC. 9. In the direction and conduct of measures under
8 this Act the Secretary shall use his best endeavors to—

9 (1) assure the avoidance of risk to human life;

10 (2) render all possible aid to distressed persons,
11 including facilitating repatriation of ships' crews; and

12 (3) not unnecessarily interfere with rights and
13 interests of others, including the flag state of any ship
14 involved, other foreign states threatened by damage,
15 and persons otherwise concerned.

16 SEC. 10. (a) The United States shall be obliged to pay
17 compensation to the extent of the damage caused by measures
18 which exceed those reasonably necessary to achieve the end
19 mentioned in section 3.

20 (b) Actions against the United States seeking com-
21 pensation for any excessive measures may be brought in the
22 United States Court of Claims, in any district court of the
23 United States, and in those courts enumerated in section
24 460 of title 28, United States Code. For purposes of this
25 Act, American Samoa shall be included within the judicial

1 district of the District Court of the United States for the
2 District of Hawaii, and the Trust Territory of the Pacific
3 Islands shall be included within the judicial districts of both
4 the District Court of the United States for the District of
5 Hawaii and the District Court of Guam.

6 SEC. 11. The Secretary of State shall notify without
7 delay foreign states concerned, the Secretary-General of the
8 Inter-Governmental Maritime Consultative Organization, and
9 persons affected by measures taken under this Act.

10 SEC. 12. (a) Any person who—

11 (1) willfully violates a provision of this Act or a
12 regulation issued thereunder; or

13 (2) willfully refuses or fails to comply with any
14 lawful order or direction given pursuant to this Act; or

15 (3) willfully obstructs any person who is acting in
16 compliance with an order or direction under this Act,
17 shall be fined not more than \$10,000 or imprisoned not
18 more than one year, or both.

19 (b) In a criminal proceeding for an offense under
20 paragraph (1) or (2) of subsection (a) of this section it
21 shall be a defense for the accused to prove that he used
22 all due diligence to comply with any order or direction
23 or that he had reasonable cause to believe that compliance
24 would have resulted in serious risk to human life.

25 SEC. 13. (a) The Secretary, in consultation with the

1 Secretary of State and the Administrator of the Environ-
2 mental Protection Agency, may nominate individuals to
3 the list of experts provided for in article III of the convention.

4 (b) The Secretary of State, in consultation with the
5 Secretary, shall designate or nominate, as appropriate and
6 necessary, the negotiators, conciliators, or arbitrators pro-
7 vided for by the convention and the annexes thereto.

8 SEC. 14. No measures may be taken under authority of
9 this Act against any warship or other ship owned or operated
10 by a country and used, for the time being, only on Govern-
11 ment noncommercial service.

12 SEC. 15. This Act shall be interpreted and administered
13 in a manner consistent with the convention and other inter-
14 national law. Except as specifically provided, nothing in
15 this Act may be interpreted to prejudice any otherwise ap-
16 plicable right, duty, privilege, or immunity or deprive any
17 country or person of any remedy otherwise applicable.

18 SEC. 16. The Secretary may issue reasonable rules and
19 regulations which he considers appropriate and necessary
20 for the effective implementation of this Act.

21 SEC. 17. The revolving fund established under section
22 311 (k) of the Federal Water Pollution Control Act shall be
23 available to the Secretary for Federal actions and activities
24 under section 5 of this Act.

1 SEC. 18. This Act shall be effective upon the date of
2 enactment, or upon the date the convention becomes effec-
3 tive as to the United States, whichever is later.

93^D CONGRESS
1ST SESSION

S. 1351

IN THE SENATE OF THE UNITED STATES

MARCH 22, 1973

Mr. MAGNUSON (by request) introduced the following bill; which was read twice
and referred to the Committee on Commerce

A BILL

To amend the Marine Protection, Research, and Sanctuaries Act
of 1972, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That:

4 (a) Subsection 3 (c) of the Marine Protection, Research,
5 and Sanctuaries Act of 1972 is amended to read as follows:

6 “(c) ‘Material’ means matter of any kind or descrip-
7 tion including, but not limited to, dredged material, solid
8 waste, incinerator residue, garbage, sewage, sludge, muni-
9 tions, radiological, chemical, and biological warfare agents,
10 radioactive materials, chemicals, biological and laboratory
11 waste, wreck or discarded equipment, rock, sand, excava-

1 tion debris, and industrial, municipal, agricultural, and other
2 waste; but such term does not mean sewage from vessels
3 within the meaning of section 312 of the Federal Water
4 Pollution Control Act, as amended (33 U.S.C. 1322). Oil
5 within the meaning of section 311 of the Federal Water
6 Pollution Control Act, as amended (33 U.S.C. 1321), shall
7 be included only insofar as such oil is taken on board a
8 vessel or aircraft for the purpose of dumping.”

9 (b) Section 3 of such Act is amended to add a new
10 subsection (l) to read as follows:

11 “(l) ‘Convention’ shall mean the Convention on the
12 Prevention of Marine Pollution by Dumping of Wastes and
13 Other Matter.”

14 SEC. 2. Section 101 of the Marine Protection, Research,
15 and Sanctuaries Act of 1972 is amended to add new subsec-
16 tions (d) and (e) to read as follows:

17 “(d) No person shall load any radiological, chemical,
18 or biological warfare agent or any high-level radioactive
19 waste, or except as may be authorized in a permit issued
20 under this title, any other material for the purpose of trans-
21 porting it for dumping into ocean waters, if such loading
22 (1) is by a vessel or aircraft registered in the United States
23 or flying the United States flag and (2) occurs in the terri-
24 tory of any foreign State not a contracting party to the
25 convention. Any permit issued for such loading shall be sub-

1 ject to regulations issued under section 108 hereof by the
2 Secretary of the Department in which the Coast Guard is
3 operating.

4 “(e) No person shall transport any material by a vessel
5 or aircraft registered in the United States or flying the
6 United States flag for the purpose of dumping such material
7 in ocean waters when the loading of the material occurs in
8 the territory of a foreign state party to the convention, except
9 pursuant to a permit issued by the foreign state in which the
10 material was loaded.”

11 SEC. 3. (a) The first sentence of subsection 102 (a) of
12 the Marine Protection, Research, and Sanctuaries Act of
13 1972 is amended to read as follows:

14 “Except in relation to dredged material, as provided for
15 in section 103 of this title, and in relation to radiological,
16 chemical, and biological warfare agents and high-level radio-
17 active waste, as provided for in section 101 of this title,
18 the Administrator may issue permits, after notice and oppor-
19 tunity for public hearings—

20 “(1) for the transportation from the United States
21 of material for the purpose of dumping it in ocean waters,
22 or (2) in the case of an agency or instrumentality of the
23 United States, for the transportation from a location out-
24 side the United States of material for the purpose of
25 dumping it in ocean waters, or (3) for the loading by

1 a vessel or aircraft registered in the United States or
2 flying the United States flag, in the territory of any
3 foreign State not a contracting party to the convention,
4 of material for the purpose of transporting it for dump-
5 ing it in ocean waters, or (4) for the dumping of mate-
6 rial into the waters described in section 101 (b) —

7 where the Administrator determines that such dumping will
8 not unreasonably degrade or endanger human health, wel-
9 fare, or amenities, or the marine environment, ecological
10 systems, or economic potentialities.”

11 (b) Subsection 103 (a) of the Act is amended to delete
12 “for the transportation of dredged material for the purpose
13 of dumping it in ocean waters” and to insert in its stead
14 the following: “for the transportation, loading, and dumping
15 of dredged material, in the instances set out in paragraphs
16 (1) through (4) of subsection 102 (a),”.

17 SEC. 4. Section 109 of the Marine Protection, Research,
18 and Sanctuaries Act of 1972 is amended to read as follows:

19 “SEC. 109. (a) The provisions of this Act shall be
20 construed in a manner which is consistent with the provisions
21 of the convention, or any amendments thereto which, as
22 interpreted by the United States, are binding upon the
23 United States.

24 “(b) It is the policy of the Congress that the President
25 shall undertake to seek effective international action and

1 cooperation to insure that all parties to the convention shall
2 carry out their requirements and obligations under the
3 convention and may formulate, present, or support specific
4 proposals in the forum provided by the international organi-
5 zation charged with providing administrative, scientific, and
6 technical services to the parties to the convention.”

DEPARTMENT OF STATE,
Washington, D.C., May 31, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate.

DEAR MR. CHAIRMAN: The Secretary has asked that I reply to your letter of March 26 requesting the comments of the Department of State on S. 1067, a bill "To amend the Oil Pollution Act, 1961 (75 Stat. 402), as amended, to implement the 1969 and the 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended; and for other purposes."

S. 1067 is motivated by three sets of amendments to the 1954 Convention: the amendments with respect to oily discharge adopted by the Assembly of the Inter-Governmental Consultative Organization (IMCO) on October 21, 1969; the amendments for the protection of the Great Barrier Reef adopted by the IMCO Assembly on October 12, 1971; and the amendments concerning tank arrangements and limitation of tank size adopted by the IMCO Assembly on October 15, 1971. The Senate has consented to the first of these amendments, and has the other two before it for advice and consent. The Department of State believes that ratification of the three sets of amendments would be in the interest of the United States. It accordingly supports the adoption of S. 1067, by which they would be implemented.

Adoption of this legislation would not result in any significant costs to the Department of State.

The Office of Management and Budget advises that from the standpoint of the Administration's program there is no objection to the submission of this report and that enactment of S. 1067 would be consistent with the Administration's objectives.

Sincerely,

MARSHALL WRIGHT,
Assistant Secretary for Congressional Relations.

NATIONAL SCIENCE FOUNDATION,
Washington, D.C., August 20, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your letter of March 26, 1973, requesting the comments of the National Science Foundation on S. 1067, the Oil Pollution Act Amendments of 1973 and S. 1070, the Intervention on the High Seas Act.

S. 1067 would amend existing domestic legislation to implement and conform to the 1969 and 1971 amendments to the National Convention for the Prevention of the Pollution of the Sea by Oil. S. 1070 would provide legislation implementing the National Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties.

Since the Foundation has no direct responsibilities under the legislation, it defers to the views of the Department of State, the Environmental Protection Agency, and other agencies directly affected by the bills.

The Office of Management and Budget has advised us that there is no objection to the submission of this report from the viewpoint of the Administration's program.

Sincerely yours,

R. L. BISPLINGHOFF
For H. GUYFORD STEVER,
Director.

DEPARTMENT OF STATE,
Washington, D.C., June 11, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate

DEAR MR. CHAIRMAN: The Secretary has asked me to reply to your letter of March 26, requesting the views of this Department on S. 1070, a bill to implement the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969.

We strongly support this legislation, which will provide the United States Government with the domestic legal authority necessary to complete its ratification of the 1969 Intervention Convention. We believe that the entry of this Convention into force is a vitally important step in enabling the United States and other coastal nations to take the actions necessary to prevent or mitigate serious oil pollution damage resulting from maritime casualties on the high seas.

The Office of Management and Budget advises that there is no objection to the submission of this report and that enactment of S. 1070 would be consistent with the objectives of the Administration.

Sincerely,

MARSHALL WRIGHT,
Assistant Secretary for Congressional Relations.

THE GENERAL COUNSEL OF THE TREASURY,
Washington, D.C., June 6, 1973.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate
Washington, D.C.

DEAR MR. CHAIRMAN: Reference is made to your request for the views of this Department on S. 1351, "To amend the Marine Protection, Research, and Sanctuaries Act of 1972, and for other purposes."

The bill would amend the above-mentioned Act to implement fully the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. The major change would be to prohibit the loading of material by a vessel or aircraft registered in the United States or flying the United States flag where the purpose of the loading was for ultimate dumping and where the material was loaded in the territory of any foreign State not a contracting party to the Convention.

As the policy considerations involved in regulating the dumping of material in the oceans, coastal and other waters within the jurisdiction of the United States do not relate to matters within the Treasury Department's jurisdiction, we are expressing no views thereon and defer to those agencies directly concerned with the subject.

The Department has been advised by the Office of Management and Budget that there is no objection from the standpoint of the Administration's program to the submission of this report to your Committee and that enactment of S. 1351 would be consistent with the Administration's objectives.

Sincerely yours,

EDWARD C. SCHMULTS,
General Counsel.

NATIONAL SCIENCE FOUNDATION,
Washington, D.C., June 12, 1973.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your letter of April 5, 1973, requesting the comments of the National Science Foundation on S. 1351, a bill "to amend the Marine Protection, Research, and Sanctuaries Act of 1972, and for other purposes."

The Marine Protection, Research, and Sanctuaries Act of 1972 (P.L. 92-532) was generated by a report to the President by the Council on Environmental Quality entitled "Ocean Dumping—a National Policy" in October 1970. Early in the 92nd Congress the Administration submitted proposed legislation to implement the recommendations of that report, and P.L. 92-532 was subsequently enacted.

S. 1351, which was referred to in the President's 1973 State of the Union Message on Natural Resources and Environment, would amend P.L. 92-532 so that it will be in accord with and implement the provisions of the recently signed Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter which has been submitted by the President to the U.S. Senate for its advice and consent.

The Foundation supports the enactment of S. 1351.

The Office of Management and Budget has advised us that there is no objection to the submission of this report and that enactment of S. 1351 would be consistent with the Administration's objectives.

Sincerely yours,

H. GUYFORD STEVER,
Director.

Senator HOLLINGS. Our first witness for today is the Honorable Russell Train, Chairman, President's Council on Environmental Quality.

We are glad to have you back before the committee.

STATEMENT OF HON. RUSSELL E. TRAIN, CHAIRMAN, COUNCIL ON ENVIRONMENTAL QUALITY

Mr. TRAIN. Thank you.

I might say, since you mention the various bills, that my prepared statement does not address any of these bills in specific terms. The text of my statement is addressed to the general positions of the United States and IMCO in connection with the upcoming convention meeting this fall.

The administration strongly supports legislation implementing the various international undertakings in this area and I want to introduce my statement with an expression of general support for those specific bills.

I do appreciate the opportunity to discuss with your committee efforts currently underway in the Intergovernmental Maritime Consultative Organization, IMCO, in the field of protection of the marine environment.

Our objectives in IMCO are ambitious. We seek nothing less than the development of a comprehensive system for protecting the marine environment from all types of vessel discharges of all types of pollutants.

We are proceeding along two lines toward that end.

First, we are preparing for IMCO's October Marine Pollution Conference with the aim of concluding a basic new convention regulating vessel discharges which will, together with the Ocean Dumping Convention concluded in London last November, establish stringent controls on all types of vessel-source pollution.

Second, we are working to build IMCO into a stronger organization, to enable it to insure that vessel-source pollution controls are adapted, revised, and supplemented over the years to come, in light of new developments and knowledge concerning protection of the marine environment.

Senator HOLLINGS. Dr. Train, are you aware of the Law of the Sea Conference?

One of the difficulties we face in settling all the various facets of the law of the sea, is establishing coastal jurisdiction limitations.

As you work on the pollution end of this, are things coordinated, and will we see a uniformity that will keep coastal States from taking unilateral action on the law of the sea questions?

Mr. TRAIN. This is coordinated, Mr. Chairman.

Going back to the time of the Ocean Dumping Convention in London, we had representatives of the State Department on our delegation to the London meeting, particularly one expert on the law of the sea.

The development of our current IMCO Convention has been undertaken in close consultation with the law of the sea experts in the Department of State, and likewise insofar as the law of the sea negotiations proper are concerned, our Council is a member of the executive committee on the interagency task force on the law of the sea.

We participate regularly in interagency discussions involving the development of law of the sea positions, and likewise we will have a member of our Council representing us in Geneva this summer during a great part of the preparatory meeting for the Law of the Sea Conference.

Senator HOLLINGS. That is the interagency task force, I believe, on the law of the sea. Are you a member of that?

Mr. TRAIN. The Council is. I have not attended it myself.

Senator HOLLINGS. Excuse me, go right ahead.

Mr. TRAIN. I am glad you got that on the record, because the matter of coordination is terribly important.

Senator HOLLINGS. I believe your work in this regard will address the very difficult task of finalizing a Law of the Sea Treaty. It is going to be very difficult, getting nations together on this important score, doing something that will help us ultimately on the treaty as a whole.

Mr. TRAIN. I think that is undoubtedly right.

Concerning the October conference, the United States has, as you know, participated fully in IMCO preparatory meetings to develop a draft convention. The most recent meetings in February and March prepared the fifth and final draft of a convention, which will be placed before the October conference.

In terms of its ability to satisfy basic U.S. objectives for the conference, one of which, of course, is adequate implementation of the Ports and Waterways Safety Act, the fifth draft is, frankly, still a somewhat mixed package. In certain aspects, it makes notable strides. In other respects, it falls short.

I would emphasize, however, that our inability to win majority support for all our positions in the preparatory meetings does not necessarily foreshadow defeat on those issues in October. Only 23 nations attended the February-March meeting. We expect at least three times that number to participate in the October conference. Thus, we will have some opportunity to regain lost ground.

As the designated chairman of the U.S. delegation to the conference, I can assure you that we will work diligently to attempt to build support for important U.S. positions now expressed in footnotes. That is, footnotes to the Draft Convention.

Moreover, we are hopeful that the summer meeting of the United Nations Seabeds Committee at Geneva starting next month will help to convince some of the nations that have been reluctant to support strict environmental controls that they must be more forthcoming. There is, obviously, an interplay between the IMCO negotiations and the Law of the Sea Conference, a point which you have just made, Mr. Chairman.

My prepared statement indicates that John Norton Moore would be here to address you on this subject this afternoon, but it is my

understanding this morning that he is not so scheduled at this time.

Senator HOLLINGS. That is right. We have been briefed informally. I have been in conference with him and we will hear from him on the record later.

Mr. TRAIN. My only point there is to indicate that he is the authoritative source for this committee on the technical law of the sea aspects of these questions.

In some respects the imminence of the LOS Conference creates risks for the October negotiations. For example, some nations whose views on jurisdictional issues differ from our own may—for tactical or other reasons—attempt to force premature decisions on jurisdictional matters at the October IMCO Conference.

As you know, we narrowly averted a major danger in that regard at the Ocean Dumping Conference last November. We are hopeful that good sense will again prevail in October, and that debates on the scope of coastal State prescriptive and enforcement jurisdiction will take place where they properly belong—in the law of the sea discussions at Geneva and Santiago. That will leave the London conference free to direct its full attention to the problem of vessel-source pollution; and 4 weeks is certainly not too long a period in which to develop the necessary controls.

In other respects, the imminence of the LOS negotiations may yield benefits in October. We cannot ignore the fact that the principle that, apart from flag state standards, only internationally prescribed environmental controls can apply to vessels on what has traditionally been considered the high seas is under serious attack at the Law of the Sea Conference preparatory meeting. This is a principle which we strongly support.

The most credible way to safeguard that principle is to demonstrate that international environmental standards can effectively protect the world's oceans and coastlines from vessel-source pollution. The October conference, in other words, may well be the proving ground for our theory that IMCO can meet coastal state concerns about anti-pollution standards for vessels.

That is why I stated a moment ago that the Geneva session of the Seabeds Committee may convince some of the reluctant maritime nations to become more forthcoming on environmental issues.

In light of what will be strong coastal state pressure for standard-setting authority over broad expanses of oceans—an arrangement which would be inadequate from an environmental point of view as well as unsatisfactory to other interests important to us—the maritime nations should be persuaded that the proper response is to work through IMCO to establish a system of international regulation which contains stringent antipollution standards, facilitates their enforcement, and is readily adaptable to new circumstances.

We should consider where we presently stand with respect to these three criteria—the stringency, enforceability and adaptability of international maritime antipollution standards.

Concerning the substantive technical regulations in the fifth draft of the new IMCO Convention, U.S. negotiators have advanced several important proposals. All are reflected in one form or another in the fifth draft.

Some were supported by a majority of those expressing an opinion at the preparatory meeting in February; others were modified; still others gained only minority support.

Let me summarize these proposals with the thought that Admiral Benkert of the Coast Guard will cover them in greater detail.

First, the U.S. delegation has proposed expanding the definition of oil from the 1954 definition of "persistent oils" to all oils, including the lighter, "nonpersistent" petroleum products, such as gasoline or kerosene, as well as vegetable and mineral oils.

Seaborne transport of highly toxic refined products is on the rise, and the U.S. proposal tracks with EPA's definition of oil under the Federal Water Pollution Control Act.

The U.S. proposal to include all petroleum products in the definition of oil gained majority support in February. However, substantial opposition still exists and the fifth draft contains a minority proposal that would establish two different categories within the broad definition of oil—in essence distinguishing between the persistent, or "black" oils and the nonpersistent or "white" oils.

Should the minority proposal prevail in October, there will undoubtedly be efforts to key operational discharge and ship construction regulations to the two categories. The opinion behind the minority proposal is that the white oils are less hazardous to the environment and should be subjected to less rigorous standards.

In the U.S. view, these oils are often likely to be more toxic than crude or black oils and merit at least as stringent regulation.

Second, recognizing that control over existing ships must be in the form of operational restrictions, the United States has proposed even tighter limitations on international discharges than those in the 1969 amendments.

These proposals, supported by only a minority in February, would extend the prohibited zone from 50 to 100 miles from land and tighten the instantaneous rate of discharge from 60 liters per mile to 30 liters per mile.

Most significantly, tankers over 100,000 deadweight tons would be limited to a total oil discharge of 1/30,000 of their cargo as opposed to 1/15,000 in the 1969 amendments.

Third, because of the inherent problems in enforcing operational performance standards, the United States has strongly advocated mandatory design and construction requirements for new ships which would avoid the need to put ballast water into cargo tanks. This means providing new ships with segregated ballast—the capacity to use separate tanks for ballast.

Studies conducted by the United States show that the most cost-effective means for providing segregated ballast in new tankers is through the use of double bottoms. Double bottoms minimize the outflow of oil from groundings, which cause four times more pollution per incident than collisions.

Segregated ballast and double bottoms are sure to be one of the most controversial technical issues involved in the October conference.

The Preparatory Committee voted in favor of mandatory segregated ballast, but only on tankers greater than 150,000 deadweight tons—too high a cutoff, in the U.S. view. In fact, it is very much too high a cutoff, in our view.

Senator HOLLINGS. What about the use of double bottoms in bringing down Alaska oil? Would that be practical to require that?

Mr. TRAIN. It would be practical.

I believe the problem there, insofar as requiring a special standard for Alaska oil coming to U.S. ports is concerned, is that we would be setting standards for one particular transportation problem, when we feel very strongly that these are problems that should be addressed by international rules whenever possible.

Senator HOLLINGS. Well, of course, we are trying to set the best example ourselves. Sometimes we have to do just that, act unilaterally, as we did with our ocean dumping bill.

I know the chairman is thinking that, I think—or some members of the committee—and I just wondered whether it was practical.

Mr. TRAIN. The practicalities would be something that I think the CG could address more effectively than I. The interrelationship of such unilateral standards to international standards is a pretty complex matter.

Now, the Ports and Waterways Safety Act does provide, as I recall, that in the event international agreement on vessel design standards is not reached by 1976 the United States might be in a position or would be directed to set unilaterally design specifications for ships entering our waters. So that this concept is not without some precedent.

We haven't acted on that yet, as you know. I think at this time our emphasis should very definitely be on trying to achieve international agreement on these standards before we start moving unilaterally, because I think that this is one of the arguments in favor of effective international agreement.

Furthermore, a majority of those voting at the Preparatory Committee rejected mandatory double bottoms as the prescribed means for achieving segregated ballast capacity and supported very late effective dates for the new tanker construction standards.

The fifth draft would apply segregated ballast standards to tankers for which building contracts are signed on or after January 1, 1978, or which are delivered on or after January 1, 1981.

We feel that these dates violate the intent of the basic resolutions establishing the objective of preventing intentional discharges at least by the end of the decade. In October we will strongly urge that earlier dates be set.

Before this meeting this morning, Mr. Chairman, I was informed that I was quoted in some publication recently as being uncertain about support of the double bottoms at the IMCO Conference.

I don't know why that uncertainty would have arisen, but I want to make perfectly clear on the record here today that the U.S. position, as well as my own personally, is strongly in favor of double bottoms to be required by international convention.

Senator HOLLINGS. Very good.

Mr. TRAIN. Although oil is likely to attract the most attention, IMCO has recognized other growing problems caused by vessel pollution of the marine environment. The October conference will also focus on performance and ship construction standards to prevent pollution from other hazardous substances, and from ship-generated sewage and garbage.

These latter two types of pollution are already subject to controls in U.S. coastal waters under laws enacted in 1970 and 1972.

Concerning the enforceability of the standards in the technical annexes, the United States fully recognizes the inadequacy, from an environmental point of view, of relying exclusively on the flag state to enforce treaty standards against its vessels in respect of high seas violations. We proposed at the February-March preparatory meeting to remedy that problem by authorizing any state party to the new convention to:

* * * cause proceedings to be taken when any ship to which the * * * Convention applies enters its ports or offshore terminals, in respect of any violation by that ship, or its owner or master, of the requirements of the Convention, wherever the violation occurred, provided, however, that such proceedings are commenced no later than [three] years after the violation occurred.

Thus, "port state enforcement" would supplement "flag state enforcement."

Instead of relying on the flag state to enforce for discharge violations outside our territorial waters—violations which can, of course, damage immediate U.S. environmental and economic interests—we ourselves could commence proceedings when the vessel entered our ports. The same would be true of other violations of the convention, such as noncompliance with construction standards or failure to report by radio a discharge in excess of treaty limitations.

That latter requirement will provide us with early warning of pollution threats, and thus enable the Coast Guard to initiate prompt countermeasures when necessary.

In addition, we might take enforcement measures against ships which enter our ports in respect of violations in distant seas, if, for example, we believed that the flag state had failed to take proper action or, perhaps, at the request of another coastal state. This latter possibility—cooperation in enforcement between two coastal states—is of great importance.

A coastal state might observe a ship discharging prohibited quantities of oil 13 miles off its shore. Under present arrangements, it would have no enforcement recourse except complaint to the flag state, which might be thousands of miles away from the ship's route and, for that or other reasons, not disposed to investigate or undertake proceedings.

Our port state enforcement proposal would allow the observing coastal state to notify, and furnish evidence to, a state whose port the ship would shortly enter. That port state could investigate and, with the aid of the evidence furnished by the observing state—such as photographs of oil traces in the vicinity of the ship—institute enforcement proceedings.

Our port state proposal would thus substantially increase the enforceability of the IMCO Convention. Our failure to win majority support for the concept at the preparatory meeting was a major disappointment. Reversing that decision at the October conference is a major objective.

Senator HOLLINGS. The distinguished Senator from Alaska is here, and I would note on the question of double bottoms for the Alaska trade, we were talking about domestic rather than international commerce.

Senator, you are telling me that vessels in the Alaska trade will have double bottoms?

Senator STEVENS. The new ones will. They are not double bottoms in the *Manhattan* sense, but they have a tank within a bottom, so that it is not the old style tanker, but a new style like the U.S.S. *Anchorage*.

The gentleman from the Coast Guard can correct me if I am wrong, but the oil is within separate tanks within the hull, so that in effect you have a double bottom.

The *Manhattan* had, in effect, a double bottom, because it had a double shell and had tanks within the shell.

I am sorry to interrupt.

Mr. TRAIN. That is a very useful addition.

Another U.S. proposal which would facilitate enforcement of the convention, at least in respect of oil discharge violations, is the so-called visible sheen test. That rule would provide that if:

* * * visible traces of oil on or below the surface of the water in the vicinity of a ship or its wake * * * can reasonably be attributed to a discharge from that ship, evidence of such traces * * * shall * * * be sufficient to establish a violation of [the Convention's oil discharge limitations] * * * unless probative evidence is presented that the ship did not discharge oil or that any discharge of the oil did not violate the provisions of [the Convention].

This rule, comparable to the test employed pursuant to our domestic legislation, would avoid the difficulties in a rule requiring the enforcing state to prove that a ship discharged oil in violation of the convention—a difficult task in view of the precise “parts per million” and “liters per mile” criteria in annex I.

I am convinced that the visible sheen test, in combination with port state enforcement, would result in a convention which can be effectively enforced. We will work in October to attempt to resolve the legal difficulties that prevented the preparatory meeting from adopting a sheen test, although there was unanimous agreement on the desirability of such means to facilitate enforcement.

The third criterion for maritime pollution controls, I mentioned earlier, is the adaptability of the international antipollution standards to changed circumstances.

As you know, we have been advocating in IMCO “tacit amendment procedures,” which would streamline the process of amending the technical regulations in the annexes by avoiding the necessity of formal ratification by a large majority of contracting states. That concept received majority support at the February–March meeting.

Two weeks ago in London, on World Environment Day, the United States proposed a comprehensive institutional system, incorporating principles based on tacit amendment procedures, to insure that standards for vessel-source pollution are adapted, revised, and supplemented over the years to come, in light of our increasing knowledge and capabilities in the area of protection of the marine environment.

We proposed that IMCO create a new Marine Environment Protection Committee, in which all member states would have full rights of participation, to coordinate and administer all IMCO activities concerning marine pollution.

The primary function of the new committee would be to exercise the authority conferred on the organization to adopt and revise regulations under international conventions for the prevention and control of vessel-source pollution. Thus, among other responsibilities, the committee would administer the 1954 Convention for the Prevention of

Pollution of the Sea by Oil, as amended, and the new Convention for the Prevention of Pollution From Ships to be developed at the October conference.

We also proposed that it administer the 1972 Convention on Ocean Dumping, and indicated that we will urge that such an arrangement be adopted when the contracting parties to that convention meet to resolve the organizational issue.

The United States will propose in October that the Marine Pollution Conference adopt measures authorizing the new committee to act with respect to the regulations under the new vessel pollution convention. In essence, our proposal will be as follows:

(1) With regard to marine pollution from vessels, the Marine Environment Protection Committee would be empowered to consider, develop, adopt, and communicate to governments, new regulations under the Conventions for which it was responsible, or modifications to existing regulations.

(2) Such new or modified regulations would enter into force on a date specified by the committee unless objections were received from a substantial number of states party to the relevant Convention, including a designated number or category of states to insure a balance of maritime and coastal interests.

(3) The committee would be empowered to adopt and bring into immediate force, appendices to regulations, without further consideration by contracting states, when the action received the unanimous consent of those participating in the committee.

In addition, the Marine Environment Protection Committee would, under our proposal, consider, on a continuing basis all related matters pertaining to the pollution of the seas by vessels and take appropriate action, including cooperation on environmental matters with other U.N. agencies, such as the U.N. Environmental Secretariat, and international organizations such as the new seabeds authority which we expect to be established by the Law of the Sea Conference.

It could disseminate scientific, technical, and economic information concerning ocean pollution and its control. It could advise member States, particularly developing countries, on technical matters, and provide practical information, recommendations, and guidelines.

The committee would, moreover, be in a position to cooperate with various expert organizations throughout the world, and would facilitate the exchange among governments of information concerning research and development activities in the field of vessel pollution control.

The committee should also consider the need for establishment of regional subcommittees, which could study problems unique to a geographic area and forward proposals to the committee for action.

Finally, the committee would receive detailed information on ship discharges under provisions in the proposed new convention, and we might give thought to possible use of committee staff in inspection and surveillance roles to aid enforcement of IMCO's marine pollution conventions.

I am pleased to report that the reaction of IMCO's governing Council to our proposal was enthusiastic. Many nations endorsed the idea of a new committee, and the Council, at our request, unanimously agreed to establish an ad hoc study group to consider the full implications of the proposal.

The study group will meet in July, and will report prior to the October conference. Needless to say, we were heartened at the response, and will follow up our proposal in July, at the October conference, and at a planned extraordinary session of the IMCO Council in November.

In sum, Mr. Chairman, we are at a critical stage in the development of an effective system for protecting the marine environment. There are risks ahead, and there is opposition to some of our positions. But there is also strong support and great potential for making this year the one in which the international community moved to meet both the standard-setting and institutional aspects of the challenge of protecting the seas from vessel-source pollution.

Thank you, Mr. Chairman.

Senator HOLLINGS. Thank you very much.

Senator STEVENS. Mr. Train, is part of your proposal going to be that the contracting states would agree to close the ports to any tankers which do not meet the standards that the agreement establishes?

Mr. TRAIN. Yes; Senator Stevens, the United States has proposed that all contracting states be required, at a given future date, to deny access to their ports to any tankers, whether registered in a contracting state or not, which do not comply with the convention standards.

Senator STEVENS. We have legislated, I think last year, Chairman Magnuson and I, I recall, worked on tightening up a bill that pertained to the Coast Guard's authority.

Mr. TRAIN. The Ports and Waterway Safety Act.

Senator STEVENS. We can prevent them from offloading under existing law, but, if these tankers are outside national jurisdiction and are not from countries signatory to the agreement, how are we going to stop them from polluting the ocean?

Mr. TRAIN. I believe they will be registered in all likelihood in countries that are signatory to the agreement. As I indicated before, Senator, under the U.S. proposal contracting states would have the duty to close their ports to any ship which does not comply with the convention standards, and the power to bring actions against any ship in their ports for any pollution violation, no matter where it occurred. We believe that if enough countries with large amounts of seaborne trade adhere to the convention, these proposals will put strong pressure on countries with large merchant fleets to comply with the convention.

Now, of course, the extent of a coastal state's jurisdiction over ships which do not enter its ports is a much more difficult question, one which the Law of the Sea Conference will have to resolve. As you may know, the United States has resisted the demands of many countries for extensive jurisdiction over passing ships out to 200 miles from shore.

Senator STEVENS. Canada, of course, has already challenged that.

Mr. TRAIN. The United States feels very strongly that limiting enforcement to action by the flag nation is inadequate, and we are very insistent that there must also be, in addition, authority to enforce by the port countries, so that irrespective of flag and irrespective of where a violation takes place on the high seas, we can enforce the convention against the ship of any signatory nation.

Senator STEVENS. I am led to believe that the long-term problem with the vast increase in the tanker traffic that the world must contemplate at the present time, the long-range problem is the problem of treating the ballast as it is exchanged for the oil that is being taken on board at the place where it is loaded.

Does the convention deal with a specific standard of parts per million that will be permitted as far as the cleaning process of the ballast as it is returned to the sea?

Mr. TRAIN. As far as discharge is concerned, yes; there are limitations.

Senator STEVENS. What is the standard?

Mr. TRAIN. For tankers the limit is not in parts per million but rather in total amount of cargo permitted to be discharged. The current draft restricts that discharge to 1/15,000 of the cargo for tankers below 100,000 deadweight tons, and 1/30,000 of the cargo for tankers above 100,000 deadweight tons. For general cargo ships the discharge limit in the current draft is 100 parts per million.

Senator STEVENS. I ask that because we had some witnesses here last week or 2 weeks ago who indicated that the state of the art is not quite in tune with the desires of the persons making the standard.

Mr. TRAIN. I would like to defer, Senator Stevens, to the next witness, who I believe would be much better informed on this technical question than I am.

Senator STEVENS. Haven't you been drafting the convention, working with these people in the international sense?

Mr. TRAIN. I have not attended the preparatory meetings, no, sir.

Senator STEVENS. I beg your pardon?

Mr. TRAIN. I did attend the IMCO Conference in London in connection with the creation of the Marine Protection Committee.

Senator STEVENS. Thank you. I appreciate your testimony.

Senator HOLLINGS. Are there any suggestions about utilizing NASA satellites for policing? A witness who was studying navigational flows and winds in the Atlantic recently told us that he said he couldn't dip his toothbrush in the mid-Atlantic without getting oil on it. Under the sheen test, the oil could be spilled all the way across the Atlantic.

On this point, we also heard Dr. White testify about weather satellites, satellites that might be in space and could, if I understood correctly, actually pick out oil spills and identify them as coming from a particular vessel.

When we are coming around to this kind of enforcement, is that in the computer coming down the road somewhere?

Mr. TRAIN. I expect it is. I expect it is still a ways off. There has been experimental work of this kind done. I think satellite surveillance provides in the long term an excellent international tool for surveillance, and provision of information to an international body such as IMCO and to the member states directly.

Senator STEVENS. I am very interested in this, Mr. Train, because Alaska is unique. We are the place that is going to be loading oil in the country, and everyone else is going to receive it. Apparently the American attitude is that they don't care what happens to the oil that is contained in the ballast because that is going to be unloaded somewhere else. We are the only ones unloading ballast, and we are

being placed on a standard, which I support, in terms of not more than 10 parts per million.

In the meanwhile, the rest of the country is supporting seven times as much daily as we will be sending from Alaska to the south 48, and I find it very interesting that no one has ever concerned themselves at all about what happened to the oil in the ballast water when they went back to load up again to bring another load to this country.

It has a lot to do with the economics of oil, if we require Alaska to obtain the ultimate in the state of the art, but our Arab friends and others don't have to have any cleaning capability on our ballast, it is certainly going to affect the price of oil as far as Alaska is concerned.

Mr. TRAIN. Well, we are proposing segregated ballast in new construction which would completely separate ballast water and cargo oil.

Senator STEVENS. I understand that. As a practical matter, you are still going to have the problem of what happens to that oil that is in there. You have to clean those tanks sometime. I don't know that you are going to have in terms of the ultimate standards on the larger tankers the same problem, but the problem is with the existing tanker capacity that is in the world today.

Are we going to modify it? You are not saying all these countries are going to agree to turn all their tankers into Manhattan's. That would cost \$30 million to convert.

Mr. TRAIN. There has been talk of retrofit provisions from time to time, but as you point out, it is costly.

Senator STEVENS. I am not worried about our tankers coming down from Alaska. They are going to be modern American tanks, but I think those who are exercised about the risk of the Alaska tanker route ought to get concerned about the hundreds of tankers coming into Portland, Maine, or San Francisco, or San Pedro, or going into New Orleans. Those tankers are going back full of our water, and they are discharging that oil in someone else's backyard today, and if we could get them a little exercised about it, I think they would be a little more interested about what we have done to protect Alaska.

Mr. TRAIN. I think that is a very good point.

Senator STEVENS. Thank you.

Senator HOLLINGS. Thank you very much. We appreciate your appearance, and we hope to later get your help on the coastal zone program.

Mr. TRAIN. I knew the day wouldn't be complete without a reference to coastal zone. I will be happy to discuss that with you and with the committee.

I hope with respect to the IMCO matter that we will have further opportunity as the fall proceeds, prior to the October meeting, to consult with you and keep in touch with you.

Senator STEVENS. Are you coordinating with the Law of the Sea Conference people with regard to what you are doing?

Mr. TRAIN. Yes.

Senator HOLLINGS. I asked the same thing. Senator Stevens and I will be in attendance at that conference, this summer.

Mr. TRAIN. We worked closely with them. Our counsel is a member of the Interagency Task Force, and a member of our council, Mr. Busterud, will be at Geneva. It is a 2-month session.

It is hard for a small group such as ourselves to stretch ourselves thinly enough to participate as fully as we would like. But he will be there for about a month. We have had law of the sea experts on our ocean dumping delegation, and, of course, in the development of our IMCO position. So we are working very closely together. It is exceedingly important.

Senator HOLLINGS. Thank you very much. We appreciate your appearance this morning.

Mr. TRAIN. Thank you.

Senator HOLLINGS. Our next witness is Mr. James J. Reynolds, president of American Institute of Merchant Shipping.

STATEMENT OF JAMES J. REYNOLDS, PRESIDENT, AMERICAN INSTITUTE OF MERCHANT SHIPPING; ACCOMPANIED BY REAR ADM. R. Y. EDWARDS, CONSULTANT; AND BARBARA D. BURKE, DIRECTOR OF LEGISLATION

Mr. REYNOLDS. Thank you for letting me go ahead of Admiral Benkert.

I think the best way to reflect the interest of the U.S. tanker people on the bills is to allow me to go through a very brief statement.

Senator HOLLINGS. Fine.

Mr. REYNOLDS. Mr. Chairman, and members of the committee, my name is James J. Reynolds. I am president of the American Institute of Merchant Shipping, an organization commonly referred to as AIMS, which is the national trade association for the U.S.-flag steamship industry.

Included among our 34 member companies are most of this nation's major proprietary and independent owners and operators of tanker vessels. AIMS is acknowledged to be the spokesman for the American merchant marine in the area of pollution prevention and environmental protection.

I appear today to urge prompt and favorable action by this subcommittee on implementing legislation for three important international agreements: the 1969 amendments to the 1954 Convention for the Prevention of Pollution of the Sea by Oil, which limit oil discharges for vessels; the 1971 amendments to the same convention, which restrict tank sizes; and the 1969 convention relating to intervention on the high seas in cases of oil pollution casualties.

The Senate has already given its advice and consent to the ratification of the 1969 amendments, which would be incorporated into domestic law by S. 1067, a measure presently before you. These amendments are a logical and needed extension of the amendments adopted in 1962 which set forth certain "prohibited zones" within which discharges are completely banned.

Most steamship operators today are already meeting the standards set forth in the 1969 amendments, which prohibit discharges of oil or oily mixtures from dry cargo ships and tankers except under specific criteria set forth separately for the two categories of vessels.

Discharges from tankers' cargo spaces of oil or oily mixtures are specifically prohibited unless the following criteria are met:

- (a) the tanker is proceeding en route;
- (b) the instantaneous rate of discharge of oil content does not exceed 60 liters per mile;
- (c) the tanker is more than 50 miles from the nearest land, and
- (d) the total quantity of oil discharge does not exceed one fifteen-thousandth of the total cargo-carrying capacity of the tanker.

Discharges from machinery space bilges of tankers and all discharges arising from any source on vessels other than tankers are permitted only when:

- (a) the vessel is proceeding en route;
- (b) the instantaneous rate of discharge of oil content does not exceed 60 liters per mile;
- (c) the oil content of such discharge is less than 100 parts per million; and
- (d) the discharge is made as far as practicable from land.

AIMS believes that the 1969 amendments are close to being adopted internationally, as provided under the rules of the Intergovernmental Maritime Consultative Organization, which will mean that enforcement authority can at that time be exercised against foreign-flag vessels as well as American ships for oil discharges.

The 1969 amendments have already been adopted by 17 nations, and can be expected to come into force shortly as international law. Applying equally to U.S. and foreign flag vessels, they represent a major step toward the goal of eliminating all intentional discharges, and will lead to a definite, immediate improvement of the ocean's environment.

S. 1067 is also the vehicle for implementing the 1971 amendments to the 1954 convention. One of these amendments defines the area of the Great Barrier Reef as land, for the purpose of the distance-from-land requirement of the same convention which prohibits any oil discharges unless vessels are more than 50 miles away from shore.

The reef is a 1,250-mile chain of cays and reefs off the Australian coast. It provides a natural haven for marine life and needs the added environmental protection that would result from adoption of this amendment.

The tank size amendments are designed to limit the amount of oil outflow that could result from a stranding or grounding incident, and thereby minimize damage from accidental oil spills.

After international acceptance of the tank size amendments, compliance is to be assured through a certification process. Each tanker to which the standards apply will be certified by its government and tankers not in compliance will be forbidden to trade. Indeed, such tankers could be denied access to the ports of a nation, Senator Stevens. I believe you asked the question earlier. It is our understanding they could be.

Senator STEVENS. Of nonsignatory nations?

Mr. REYNOLDS. If the vessel did not have a certification it is meeting the requirements of the convention.

Senator STEVENS. There are a couple of sailing vessel type tankers out in the Pacific islands under our jurisdiction. Modern nations prohibit them, but they are going to go somewhere. I think we ought to find out where they are going to go. Where are we pushing the junk of the ocean? We are going to close them off, but I think we ought to

find a way of prohibiting them. They are going to go to nonsignatory ports and be involved on the high seas anyway.

Mr. REYNOLDS. The only comfort I could express on that issue is that most of these vessels are approaching the end of their useful lives. There will be a time when they will be turned into scrap. There is no question about it. If we get into the business of assuring that all new tankers are being constructed with all the safeguards of international protection, such as tank size, segregated ballast and so on, I think we are on the way toward doing the job.

There are going to be deficiencies for a time, but I do not think that we can require the retrofitting of a lot of these vessels. It is just prohibitively expensive.

Senator STEVENS. I think you have to understand my basic prejudice. I am under attack all the time about these terrible tankers that are supposed to be coming out of Valdez, and their discharge standards are not to exceed 10 parts per million, and I read that we have agreed internationally that as long as the discharge is more than 50 miles from land and the oil content does not exceed 60 liters per mile, there is no problem about it at all.

We have agreed to this. Our Government has agreed to this. Why do we agree to this and put 10 parts per million on the Alaska tankers? It is because it is our backyard, and I appreciate that, but I wonder why we do not protect everyone else's backyard.

Mr. REYNOLDS. Who is putting on the 10 parts per million on Alaskan tankers?

Senator STEVENS. The EPA and the Federal Government, not to exceed 10 parts per million.

Mr. REYNOLDS. The U.S. industry, which is the industry that will be trading from Valdez to the States under the Jones Act, has already agreed it will construct adequate reception facilities in Alaska, so that there will be no discharge of oil.

Senator STEVENS. There is no such thing as no discharge. We are in agreement with the standards. We agree with it, but we are facing this fantastic opposition from the rest of the country saying, "Oh, isn't this terrible; they are going to put this oil into Valdez," and that oil going in there is one-tenth of the amount we have allowed to be spread across the oceans of the world under an agreement we have negotiated already.

That is my point, and I think it is high time—I think what I am going to do is get on the floor and put a little thing on this, that whatever standards we put for Valdez, we are going to insist on the rest of the world as far as American tankers are concerned, and maybe some people from Maryland and from South Carolina and Texas and Louisiana and out in California will start waking up to what is going on, that we have already met the state of the art in terms of Valdez tankers.

This is a great thing. I do not know whether this is legitimate.

Incidentally, there are no parts per million in terms of the discharge from oily mixtures in cargo spaces for oil. Do you know why that is?

Mr. REYNOLDS. There is no parts per million. Quite frankly, the parts per million criterion is also an unrealistic one. It is almost beyond the capacity to measure when oily mixture is being discharged

from a vessel and the vessel is en route; there are not yet in the state of the art accurate devices to measure the parts per million.

Now, if the restriction is that no more than 60 liters can be discharged over a mile when the vessel is in process, it seems to those who designed this that that is an adequate safeguard providing it is at least 50 miles from shore. Sixty liters per mile, spread over a nautical mile, is so minimal that the sea would have a very ready toleration for it, and would never find its way to the shores of any land area, as a danger to the environment or esthetics or marine life.

Senator STEVENS. Salmon spend about 3 weeks of their total life in the waters of Alaska and the rest of the time they are out on the high seas. They are anadromous fish. In order to protect them for those 3 weeks, we have put very stringent standards in terms of Alaskan waters, but all they are saying to me is that Japanese tankers that are the tankers that are taking oil to Japan, can spread mile after mile after mile of oil over the salmon when they mature on the high seas, but when they come home, it is 10 parts per million.

I think the world is crazy. The area that is of concern to the fisheries of the world is the high seas. I have never seen it spelled out the way your statement does in terms of parts per million, but it is really very far from being a sufficient standard as far as I am concerned, and I think that we are going to have to take this up with our colleagues that follow you.

Mr. REYNOLDS. I think, Senator Stevens, with great respect, this is one observation that would be relevant, and that is that one of the criteria of the convention is that no more than 1/150 thousandth of the capacity of the vessel can be discharged. I have a hypothetical picture of a tanker going out spewing out oil over its entire voyage, and that is unrealistic. I say that with respect.

I have no doubt that there are obscene violators of any standards.

Senator STEVENS. On a 150,000-ton tanker, you are going to allow them to spill 10 tons, and in Alaska we are talking about spilling a barrel a day in an operation of 2 million barrels a day.

Mr. REYNOLDS. I think it is magnificent that Alaska is doing it, and American industry is eager to cooperate. I am sure the waters of Alaska will improve while the Valdez process is going on, rather than degrading, because I am sure that in the construction of tankers and reception facilities, all will see to it that those waters are cleaned up, rather than degraded.

Senator STEVENS. I agree. I want my friends from Maine to realize that the 900 tankers per year that come into Portland, Maine, are going somewhere and discharging oil somewhere.

Thank you, very much.

Mr. REYNOLDS. Mr. Chairman, those familiar with the upcoming Marine Pollution Conference scheduled for October 1973 by the Intergovernmental Maritime Consultative Organization (IMCO) may be aware that the expected result is a new convention to replace the 1954 Oil Pollution Convention.

Major additional steps toward the no-discharge goal are anticipated, primarily through the adoption of tanker construction standards.

One might well ask why rush ahead with the 1969 and 1971 amendments when they will be superseded by the new convention? The answer is simple: These amendments are long overdue and they assure

greater protection from oil pollution now while the new agreement is being adopted internationally, a procedure which unfortunately may take several years.

We also appear in support of S. 1070, implementing legislation for the Intervention Convention which was approved by the Senate on September 20, 1971. Adopted in 1969, this convention was prompted by the 1967 Torrey Canyon disaster which highlighted a gap in international law with regard to major pollution accidents on the high seas.

To date, 9 of the required 15 countries have ratified this convention, which permits a coastal nation to take necessary steps to prevent, mitigate, or eliminate the threat of damage to its shoreline when the threat occurs beyond that nation's territorial sea.

The steam ship companies represented by AIMS believe that the authority to take action on the high seas, given by this convention and the implementing legislation, is desirable. In other words, the industry itself is supporting the right of the Government to go so far as to destroy a ship that creates an imminent threat to the ecology of a nation.

We also believe that the safeguards incorporated in this agreement are sufficient to protect the interests of the shipowner in the event that the intervening nation causes unnecessary damage to a vessel.

No discussion of oil pollution would be complete without attention to the shipowner liability and damage claim mechanism which would be set up internationally with adoption of the Civil Liability Convention and the Oil Compensation Fund.

These conventions would be implemented domestically by S. 841, a bill also pending before this committee. Together, they offer the best protection possible for victims of oil pollution damage without bringing a halt to ocean transportation of oil needed by this country.

The fund supplements the \$15-million liability of the shipowner in case of an oil spill by collecting \$32.4 million (which will increase to \$16.8 million liability and a \$36-million fund as soon as the dollar devaluation bill becomes law) in contributions from oil receivers. The fund would pay out uncollectable damages owed under the Liability Convention, as well as damages not covered by that convention, leaving a defense only for acts of war. In addition, the fund would be available in the case of a vessel which causes pollution damage to our land or territorial seas but is outside the jurisdiction of this country or any of its States.

Prompt action by the United States would go a long way toward bringing this oil pollution compensation mechanism into effect internationally, a goal that could easily be achieved next year, according to estimates by the State Department.

Mr. Chairman, this completes our testimony on the specific items presently under consideration. With your permission, I should now like to make a brief statement of our industry's views on the uses of the oceans and on the need for strong, effective, uniform international standards that will insure the proper protection of the environment and that will enable the steamship industry to continue providing the services on which mankind is so reliant.

As you know, two major diplomatic conferences affecting the use of the ocean by vessels are to be held within the next 13 months. The first, which I have already mentioned briefly, is the Conference on

Marine Pollution which convenes in October of this year under the auspices of IMCO, the arm of the United Nations which is responsible for maritime matters.

The basic goal of this conference is to develop and adopt a convention that will lead to the end of all intentional discharges and minimize the possibility of accidental discharges resulting from collisions and strandings. Over the past 3 years of preparations for the conference, a draft convention has been developed and is currently being intensively reviewed by Government, industry, and environmental groups within the United States and in other countries throughout the world.

All of our members support the goals of the conference, Mr. Chairman, and we have also advised the Coast Guard that we are in agreement on those general principles, including the requirements for mandatory segregated ballast systems, which are contained in the current draft.

The second event of major importance is the law of the Sea Conference, which convenes briefly for a procedural session in November, and then for an 8-week substantive session in July of 1974.

Among the major items on the tentative agenda, three are of particular interest to the maritime industry, namely, the breadth of the territorial sea, the use of international straits, and the protection of the marine environment.

Hopefully, the Conference will be able to reach agreement on these issues, and to incorporate them into one or more international conventions. Here too, we have advised the State Department on numerous occasions of our industry's support for the development of a stringent, uniform legal regime which will govern the use of the oceans by vessel operators and by all other interests concerned.

I mention these two important activities to illustrate a particular problem which the U.S. flag steamship industry faces today. While much of the rest of the world moves forward more or less in step to seek international solutions to the problems of marine pollution, unilateral measures continue to be taken in the United States which hamper our industry, which result in additional costs that are ultimately passed on to the consumer, and which most regrettably have little, if any, beneficial environmental impact.

A case in point is the Supreme Court's recent decision upholding the State of Florida's Oil Pollution Prevention and Control Act. Acting under a loophole in the Federal Water Pollution Control Act, Florida adopted an act in 1970 which imposes unlimited and absolute liability on all vessels serving that State for cleanup costs and consequential damages to third parties and contains related certification of financial responsibility requirements. Now that the Supreme Court has made its decision, a number of other tidewater States seem likely to enact similar statutes.

The impact of all this on the environment will be nil, in my opinion. Cleanup costs are already the responsibility of the Federal Government. No insurance company can possibly provide unlimited, absolute liability for all consequential damages and so some operators may well decide to avoid serving States with such a statute, since the risk is too great. And costs associated with the certificate provisions, which merely duplicate Federal requirements, will be passed on to the users.

Another problem encountered in the United States is this country's apparent inability to ratify conventions and amendments and enact implementing legislation in a timely manner. The Civil Liability and Oil Fund Conventions, which I mentioned a few moments ago, illustrate this point. One was adopted in 1969, the other in 1971. The U.S. Government participated extensively in the drafting and adoption of both.

Most positions urged by the United States were adopted. While they are not absolute perfection, when measured by objective standards, they represent a significant step forward in the protection of the environment. And yet they remain unratified and unimplemented.

What will happen when the Marine Pollution and Law of the Sea Conferences have been concluded, and the conventions have been brought back to Washington? It is likely that these documents will contain possible imperfections and compromises, too. Will this result in their being placed on the back burner until 1980 or longer?

I simply do not know the answers to the last few questions I have asked, Mr. Chairman, but I do feel that they would be well worth your future consideration. The members of our association and I deeply appreciate the invitation to appear before you today, and hope that our views will be given favorable consideration.

That is the end of this brief prepared statement, Mr. Chairman. If there are questions, we will be glad to answer them.

Senator STEVENSON. We are glad to hear from you. I regret that I arrived late and did not have a chance to hear all of it. I will read it.

We have no questions. I would hope that we might, if we do have questions, get in touch with you later on it. We will keep the record open.

Mr. REYNOLDS. Thank you.

Senator STEVENSON. We have run out of time, and we also have run out of Senators. I am 15 minutes late for a meeting. I regret the inconvenience that we have caused our next witnesses, but I am going to have to accept for the record their written statements and ask that they be available to answer any questions the committee may have.

Thank you, Mr. Reynolds, and thank also, Mr. Salmon, Mr. Greenberg, and Admiral Benkert, and I apologize for the inconvenience to which we have put them.

If we have the statements, they will be entered in the record without objection, and we may have questions which I hope you will be able to answer for us.

[Whereupon, at 11:15 a.m., the hearing was adjourned, subject to the call of the Chair.]

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

QUESTIONS SUBMITTED BY THE COMMITTEE REGARDING THE 1954 CONVENTION ON THE PREVENTION OF POLLUTION OF THE SEA BY OIL, AND THE 1969 AND 1971 AMENDMENTS THERETO

1954 CONVENTION

1. What is the number of proven violations of this treaty on a world-wide basis since its operative date?

This information is not currently available to the Coast Guard. However Articles X(2) and XII of the Convention require that reports of proceedings taken in respect of alleged contraventions of the Convention and of the results of the application of the provisions of the Convention be sent to the Intergovernmental Maritime Consultative Organization (IMCO). Accordingly we have requested this information from IMCO. When it is received we shall forward it to your committee for your consideration.

2. How many violations can be attributed to U.S. flag vessels? How many convictions and/or penalties have resulted? How many violations were detected between 12 and 50 miles?

During the period from 1969 through 1972, the Coast Guard has investigated seven violations of the 1954 Convention by foreign vessels in prohibited zones off United States shores. One violation by a United States vessel of the Oil Pollution Act of 1961, as amended, was detected in Cook Inlet, Alaska. Two violations of the Convention by United States vessels were reported to the United States Government by foreign governments, Canada and France. In the Cook Inlet incident, the Coast Guard initiated personnel action under R.S. 4450 against the master of the vessel. The violation reported by Canada resulted in the suspension for three months of licenses and documents issued to the master of the vessel by the Coast Guard. The violation reported by France is under investigation. Only two violations of either the Convention or the Oil Pollution Act of 1961, as amended, were detected beyond 12 miles from United States shores, both involving foreign vessels. Two more oil pollution incidents were detected between 12 and 50 miles, both involving foreign vessels under flags of nations not signatory to the 1954 Convention.

3. What are the sanctions which can be brought against an offending vessel or master?

Under the domestic statute implementing the provisions of the Convention, the Oil Pollution Act of 1961, as amended, the following sanctions are available against ships of American registry or nationality and their owners, operators, agents, masters, officers, or employees:

a. For the violation of the prohibition against oil discharge and any regulation promulgated with respect to this prohibition.

(1) Fine not exceeding \$2,500 nor less than \$500; imprisonment not exceeding one year, or both (misdemeanor).

(2) *In rem* liability in the amount of pecuniary penalty specified in (1) for a ship violating that prohibition or regulation.

(3) Denial of clearance of such a ship from a port in the United States until the penalty is paid.

(4) Suspension or revocation of the license issued to the master or other licensed officer of such a ship under RS 4450.

b. For the violation of regulations implementing Article VII of the Convention—civil penalty not in excess of \$100.

c. For the failure to comply with the requirements imposed by the Act respecting the maintenance of an oil record book—fine not exceeding \$1,000 nor less than \$500.

d. For making a false or misleading entry in oil record book or other records required to be maintained under the Act or regulations promulgated thereunder—fine not exceeding \$1,000 nor less than \$500, imprisonment not exceeding six months, or both.

Have these sanctions, in your opinion, been effective in deterring operational discharges? If not, why not?

The sanctions related to the discharge of oil in violation of the Act and Convention would no doubt be adequate to deter operational discharges if the evidentiary problem in proving such discharges were not so difficult. It should be noted however that the \$2,500 maximum penalty is only half the civil penalty which may be assessed under section 311(b) (6) of the Federal Water Pollution Control Act for the discharge of harmful quantities of oil in the waters of the United States and contiguous zone. The sanctions related to the maintenance of the oil record book and other records go a long way in providing an effective deterrent to operational discharges. The evidentiary problem in this case is not so great. Further, the oil record book and its required maintenance provides the means by which the evidentiary problem involved in proving a violative discharge may be overcome.

4. Does the United States have sufficient manpower and equipment to adequately enforce the Convention as to United States flag vessels? What other nations could be considered to be fully capable of policing the terms of the treaty?

We are presently projecting a shortage of approximately 7,000 medium range surveillance aircraft mission hours for FY75. Any additional mission requirements will only aggravate this situation. Surveillance by cutters could possibly be conducted in conjunction with presently anticipated and scheduled missions such as offshore fisheries enforcement patrols or International Ice Patrol. At this time it is not possible to quantify the at-sea cutter requirements of this treaty; however we are gradually increasing our efforts in the fisheries enforcement area and by FY75 plan over 2000 cutter-days per year for this mission. In addition, the impact of recent legislation, specifically the Marine Protection, Research, and Sanctuaries Act of 1972, has not yet been fully evaluated for demand on our resources.

In response to the second portion of the question, we are unable to assess the ability of other nations to police the terms of the treaty at this time.

5. Has the Coast Guard detected violations by foreign vessels flying flags of nations not party to the Convention? What has been the experience in regard to such vessels?

The Coast Guard has investigated two oil pollution incidents by foreign vessels flying flags of nations not signatory to the 1954 Convention. One of these was detected and reported to the Coast Guard by a Canadian pilot off the coast of New Jersey. Reports of these violations were transmitted to the foreign governments for appropriate action to minimize such occurrences. We have no indication of what action was taken.

6. What violations of both foreign and United States vessels have been detected with regard to the oil record book?

The following violations of oil record book requirements by United States and foreign vessels have been detected by the Coast Guard through boarding in ports:

Year	U.S. vessels	Foreign vessels
1967.....	169	292
1968.....	73	199
1969.....	24	137
1970.....		74
1971.....		48
1972.....		1
1973 (to date).....		4

The decrease in reported violations is presumably the result of improved compliance with oil record book requirements.

7. Generally, what is the enforcement practice of the Coast Guard in the event of a violation of the terms of the 1954 Convention, as implemented? What evidentiary problems have been encountered?

The Oil Pollution Act of 1961, as amended, which implements the 1954 Convention for vessels registered in the United States, provides for the seizure of an offending vessel to ensure payment of possible fines. If an offense is committed in the presence of a law enforcement officer, the master of the vessel may be arrested without a warrant. Under certain provisions of the Act, the Coast Guard may request the Bureau of Customs to withhold an offending vessel's clearance to

leave port, ensuring the payment of a levied fine or penalty or the posting of a penalty bond or other surety. Foreign vessels outside United States navigable (territorial) waters may not be stopped and boarded for violations of the 1954 Convention. A foreign vessel is advised immediately of its suspected violation, and a report of the incident is sent by message to the district commander. The Coast Guard unit covering the incident also files a written violation report, documented with photographs and any other evidence which may be obtained. Foreign vessels are boarded routinely in United States ports and checked for compliance with oil record book requirements. Reports of prohibited discharges and oil record book violations by vessels of nations signatory to the 1954 Convention are transmitted via the Department of State to the nation of registry for prosecution under domestic law. Violations of the 1954 Convention present serious evidentiary problems, since a discharge in excess of 100 parts oil per million parts mixture must be proved, and because of various "excepted or legal discharges" which may be claimed in defense. Furthermore, tankers must discharge oily mixtures beyond the present prohibited zones (or "more than 50 miles from the nearest land" under the 1969 Amendments), but ships other than tankers are required to discharge oily mixtures only "as far as practicable from land". Although it may be assumed that a visible oil slick will approach the 100 ppm limit, there is no known way to measure quantitatively the oil content of a discharge unless the oily mixture is in an enclosed body of water of known or measurable quantity unless a vessel is observed and photographed discharging gross quantities of oil into the sea, the establishment of a case rests on the possibility that the oil record book was improperly maintained. The collection of samples is a practical impossibility on the high seas, where violations are generally detected by fixed-wing aircraft.

8. *From the standpoint of practicality, is it more difficult to enforce an operational discharge standard based on parts per million or a vessel construction standard?*

An operational discharge standard based on parts oil per million parts mixture certainly presents greater practical enforcement difficulties than a vessel construction standard, for two reasons. First, adherence to an operational discharge standard must rely heavily on human judgment. Discharges of oily mixtures must be carefully monitored to control oil content. Unless a law enforcement officer skilled in vessel operations is placed on every ship, we must rely upon the diligence and integrity of vessel masters, who operate within severe competitive constraints. A vessel construction standard, however, such as segregated ballast, tanks for retention of oily wastes on board, and so forth, greatly reduces reliance upon human judgment. Control of oily discharges is essentially built into the vessel, eliminating critical monitoring functions. Second, it is far more difficult to demonstrate violation of an operational discharge standard than of a vessel construction standard. In the former case, we must document the discharge, determine the oil content, prove that the discharge was not a legal exception, and so forth, requiring that we be on-scene at the time of the discharge and take samples, which is rarely practical on the high seas. Violation of a vessel construction standard, on the other hand, would generally be detectable at any time in any port, merely by boarding and inspecting the vessel.

9. *What devices are being investigated by the Coast Guard to improve enforcement capability, i.e. labeling or marking of oil, sensors, infrared cameras, satellites, etc?*

The Coast Guard Office of Research and Development is currently investigating several techniques for airborne oil surveillance. A multi-sensor detection prototype will detect and map oil slicks over a 50 mile swath, day and night, in all weather. A laser surveillance system will identify oil type by characteristic fluorescent emission spectra. Imagery from Skylab and the Earth Resources Technology Satellites will be evaluated for the applicability of satellite detection of oil slicks. Microwave thickness determination will add quantification capability to the multi-sensor detection system. Differential TV using low-light-level cameras will also improve oil detection capability. Besides these airborne systems, sensors being developed for fixed installation in port areas might also be installed on buoys close offshore. The "tagging" of oil for identification purposes, i.e. the addition of unique, innocuous foreign substances to oil at its source, is also being examined by the Coast Guard. This technique offers great potential for positive identification of discharged oil, but its enormous cost makes implementation unlikely. Besides these systems under development, the Coast Guard now has an operational Airborne Remote Sensing System for the detection of oil utilizing infra-red and ultraviolet sensors aboard three Coast Guard aircraft. Three more aircraft will be fitted with these sensors by next month.

1969 AMENDMENTS

1. What enforcement difficulties does the Coast Guard foresee under the proposed operational discharge amendments? In particular what enforcement capability does the Coast Guard have beyond 50 miles, and what is necessary to prove a violation of the rate of discharge requirement, or the mixture (ppm) requirement?

There is no known means of determining the oil content of a discharge once it has entered the sea, unless the oily mixture is in an enclosed body of water of known or measurable quantity. Sample collection in any case is a practical impossibility on the high seas. The "instantaneous rate of discharge of oil content" is even more impractical to determine than oil content of 100 ppm, since it requires knowledge of both the rate of discharge of oil (not oily mixture) in liters per hour and the speed of the vessel at the same instant. Both oil content standards and rate of discharge requirements are essentially unenforceable unless they are grossly violated and the vessel is observed and photographed as the discharge occurs. In the absence of such documentation of a gross violation, the establishment of a case rests on the possibility that the oil record book was improperly maintained. The Coast Guard maintains the enforcement capability to board all vessels of Contracting States to the 1954 Convention while they are in United States ports and inspect their oil record books.

2. Can tankers achieve the 1/15,000 requirements?

There are two ways of looking at this question. first, is to look at each tanker on an individual, theoretical basis and the second is to look at the worldwide tanker fleet.

a. For ships on an individual basis the answer is a qualified yes.

If the ship is properly designed and if we assume: (1) A ballast level of 45% of full load displacement including some 14-20% in segregated ballast and including some 12-17% in the lightship weight; (2) a 0.4% clingage factor; (3) that tankers clean only those tanks which are ballasted; and (4) that sufficient voyage time and weather conditions are present to allow the LOT procedure to operate at maximum effectiveness (voyage needs to be at least 3-4 days).

Then tankers could achieve the 1/15,000 requirement if the LOT procedure used is 80-92% effective. Several studies show that the average LOT procedure is at present approximately 80% effective. Effectiveness of LOT is very dependent on the personnel using the procedure. The answer to question #3. explains some of the problems of LOT.

b. For the worldwide tanker fleet we can see from Table XX, which is attached with Question #4., that the oil discharged from ballasting and tank cleaning, assuming a 90% LOT effectiveness, is approximately twice that allowed by the 1/15,000 requirement, since the worldwide tanker fleet, on an average, has a lesser amount of segregated ballast than the newer crude-oil ships examined in part a.

3. Would a load-on-top procedure bring all tankers into compliance with these requirements, including short-haul tankers?

Load-on-top is a procedure than cannot be used by all tankers. Approximately 80% of the world tanker fleet is presently employing some form of LOT. The remaining 20% of the fleet does not use this procedure for a variety of reasons. Some of the problems encountered in using LOT are:

a. The LOT system cannot be applied to tankers in the nonpersistent oil product trade since finished products cannot be mixed with one another and cannot tolerate salt content in the same way as most crude oils.

b. Ballast voyages can be so short as to preclude the time necessary for satisfactory operation of the LOT systems.

c. Depending on sea conditions, the necessary separation process may not be completely effective.

d. The ability to accurately determine the oil-water interface in the holding tank is lacking and subsequently results in drawing off a portion of the lower layer of oil along with the water.

The non-LOT tankers will need to have some other methods available to allow them to meet the 1/15,000 requirement.

4. Assuming all tankers complied with the 1969 discharge requirements, is it possible that the total amount of oil pollution attributable to intentional vessel discharges will actually increase in the long run given the anticipated increase in oil carrying tanker traffic in the next 20 years?

Present day statistics for intentional discharges from tank cleaning for ballasting varies between 530,000 tons and 1,240,000 tons depending on which figures are used. The average is approximately 800,000 tons. These figures do not include tank cleaning for the removal of sludge build-up or tank cleanings done prior to entering a shipyard for repairs. The United Kingdom in a study, "The Environmental and Financial Consequences of Oil Pollution from Ships," presents in Table XX of Appendix I, a summary of oil discharged from ballasting and deballasting operations. These figures are projected to year 2000. The table is based on crude oil transportation only and the figures are calculated using an effectiveness of LOT of 90%. (Table XX is attached).

The amount of pollution from LOT and non-LOT discharges is lower in Table XX than the average calculated from several sources. So we could say the estimates are conservative. We see that in 1990 if the 1/15,000 criteria is *strictly* followed only 240,000–250,000 tons of oil would be intentionally discharged, a threefold reduction from the 800,000 tons today. However, we also see that if present trends continue by 1990 approximately 2,250,000 tons could be discharged into the oceans—threefold increase.

We can conclude that if all the tankers in year 1990 could operate a LOT procedure with sufficient effectiveness to meet the 1969 Amendments, then the total amount of oil discharged would be reduced to approximately one-third of that discharged today. The key is gaining the required degree of effectiveness of LOT and effectively dealing with those vessels unable to practice LOT for a variety of reasons.

TABLE XX.—OIL DISCHARGED IN DEBALLASTING AND TANK-WASHING OPERATIONS: FUTURE TRENDS (TONS P.A.).

Year	Seaborne crude oil	L.O.T. practice: 80 percent of world tanker tonnage					L.O.T. practice: 100 percent		Permitted limits (1969 amend- ments)
		L.O.T. discharges		Non- L.O.T. discharges	Total discharges		Present efficiency	Theoreti- cal minimum	
		Present efficiency	Theoreti- cal minimum		Present L.O.T. efficiency	Theoretical L.O.T. minimum			
1970-----	940,000	105,000	8,000	530,000	635,000	538,000	131,000	10,000	63,000
1980-----	2,400,000	268,000	20,000	1,350,000	1,618,000	1,370,000	335,000	26,000	160,000
1990-----	3,300,000	369,000	28,000	1,860,000	2,229,000	1,888,000	461,000	35,000	220,000
2000-----	3,900,000	436,000	33,000	2,200,000	2,636,000	2,233,000	545,000	42,000	260,000

1971 AMENDMENTS

1. What is the estimated cost of these requirements in terms of: (a) construction costs; (b) increase in the required freight rate; and (c) additional cost of a gallon of gas at the pump?

The 1971 Amendments to the 1954 Convention on the Pollution of the Sea by Oil relate to the arrangements of vessel tanks and limitations of tank size for new tankers. The objectives of these amendments are to place a theoretical limit on the quantity of oil which can escape into the sea as a result of a collision or other casualty.

The attempt to assign cost data to the implications of the amendment is tenuous at best for the reason that this is a criterion to which a ship must be designed and not a material requirement. At the time of development of this amendment at IMCO, however, the Italian delegation and the International Chamber of Shipping (ICS) representative did attempt to quantify the cost on a "typical ship" basis. The Italian report concluded that the amendment "did not affect the transportation cost of the cargo for tankers up to 300,000–400,000 tons deadweight. In larger sizes, they affect this cost in a percentage (approximately 1.5 percent) apparently insignificant if compared with the benefit one (may) hope to expect from the limited oil outflow". The ICS indicated that these amendments for the ships they investigated amounted to approximately a \$100 capital investment per cubic meter of oil saved. Relative to clean-up costs this is rather attractive.

Quantitatively, the capital costs and increases in required freight rates cannot be estimated. Qualitatively, both of these figures can be said to vary between a negligible amount to at most 2% for the very largest tankers envisioned up to 1,000,000 tons deadweight.

As far as cost of gasoline at the pump, this answer requires deep insight to oil company economics and corporate decision making. That is, how much of

the cost will be passed on to the consumer? In the very worst case, including taxes, marine transportation costs, as stated by the American Institute of Merchant Shipping (AIMS) at hearings before the House Subcommittee on Coast Guard and Navigation of the House Merchant Marine and Fisheries Committee last week, could amount to 20%. A 2% increase in transportation thus translates to an additional 2 mills to the gallon presuming the entire cost increased is passed on to the consumer on a 40 cent cost per gallon of gasoline.

STATEMENT OF REAR ADM. W. M. BENKERT, CHIEF, COAST GUARD, OFFICE OF
MARINE ENVIRONMENT AND SYSTEMS

Mr. CHAIRMAN. It is a pleasure to be able to appear today before this Subcommittee. I am Rear Admiral W. M. Benkert, Chief of the Coast Guard's Office of Marine Environment and Systems. I am here today upon your invitation to the Commandant of the Coast Guard and will be discussing the 1969 and 1971 amendments to the 1954 Convention on the Pollution of the Sea by Oil and the Intervention Convention in the context of the hopefully forthcoming 1973 Convention on Marine Pollution from Ships.

1954 OIL POLLUTION CONVENTION

The oil pollution convention of 1954 was a first attempt by international agreement to control the growing problem of pollution of the sea by oil.

As a matter of background, I would like to highlight the more significant provisions of the existing convention. It establishes certain ocean zones within which tankers of 150 gross tons and above are prohibited from discharging oil or an oily mixture as defined in the convention. The prohibited zones are set forth as all sea areas within 50 miles from the nearest land. Additional specified sea areas, insofar as they extend more than 50 miles from the nearest land, also are established as prohibited zones. These sea areas cover certain portions of the Pacific Ocean, North Atlantic Ocean, North Sea, and the Baltic Sea. With respect to ships other than tankers, the existing convention provides that the discharge of oil or oily mixture shall be made as far as practicable from land.

New vessels, over 20,000 tons, built after the convention came into force, are prohibited from discharging oil or oily mixtures anywhere in the oceans except under special circumstances where it is neither reasonable nor practicable to retain the oil or oily mixture on board, in which case discharge may be accomplished outside the prohibited zones. I might add that under the existing convention there is no quantitative regulation of such discharges for any vessel in the ocean areas not specified as prohibited zones.

The discharges prohibited by the convention do not apply when the discharge is made to secure the safety of a ship, to prevent damage to a ship or cargo, or saving life at sea, nor do the prohibitions apply to the escape of oil or oily mixture resulting from damage to a ship or unavoidable leakage, nor to the discharge of residue arising from the purification of fuel oil or lubricating oil provided such discharge is made as far from land as practicable.

The convention also requires every ship which uses fuel oil and every tanker to carry an oil record book in which must be recorded various operations such as the ballasting of and discharge of ballast from the cargo tanks of tankers; cleaning of such cargo tanks; settling in slop tanks and discharge of water from tankers; and other related activities on tankers and ships other than tankers.

IMPACT OF 1969 AND 1971 AMENDMENTS

With the foregoing comments as background, I will now turn to the impact of the 1969 amendments. At the outset it may be stated that these amendments were based on the premise that in order to achieve significant progress on prevention and control of pollution at sea, it was necessary to establish measures with respect to the instantaneous rate of discharge from ships at sea, maximum oil content of the discharged mixture, and the total quantity of oil discharged by tankers on a ballast voyage.

The amendments consist of nine substantive changes to the existing 1954 Convention:

One of the principal changes was to Article III and was based on the principle of total prohibition of oil discharge subject to certain specified exceptions. This amendment eliminated any free zones at sea where dumping or discharge of oil is not now regulated. In this connection, I emphasize that under the present convention and under implementing domestic law, other than respect of new vessels, generally there is no regulation of oil discharges outside the prohibited

zones. Thus, there are free zones in the oceans where discharge of oil may be most indiscriminate. The exceptions to Article III, as amended, require that a tanker be proceeding en route (i.e. from one port to another), that the "instantaneous rate of discharge of oil content" not exceed 60 litres per mile, and that the total quantity discharged on a ballast voyage be limited to 1/15,000 of the total cargo carrying capacity, and also that any discharge must be more than 50 miles from land. This criterion for a limited rate of discharge introduces a limit that could result in a substantial reduction from present allowable oil discharge levels.

With respect to ships other than tankers, the amendment provides that the oil content of the discharge must be less than 100 parts per 1,000,000 parts of the mixture and the discharge must be made as far as practicable from land. The other provisions concerning instantaneous rate of discharge and "proceeding en route" also apply.

Returning again to tankers, it should be noted that the amendment with respect to control measures does not apply to the discharge of ballast from a cargo tank which has been freshly cleaned provided that any effluent, if discharged from a stationary tanker into calm water on a clear day, leaves no visible traces on the surface of the water.

The definitions in Article I of the Convention were amended to take into account the new control measures just described. For example, a definition was provided for "instantaneous rate of discharge of oil content" to mean the rate of discharge of oil in litres per hour at any instant divided by the speed of the ship in knots (nautical miles per hour) at that instant. The term "heavy diesel oil" was amended by removing the limitation that it be "marine" diesel oil, and the term "oily mixture" was revised to mean a mixture with any content of oil as defined by the Convention. Oil is defined by the Convention as crude oil, fuel oil, heavy diesel oil and lubricating oil. The definition of the term "from nearest land" was transferred from Annex A which set out the prohibited zones now made obsolete by new Article III.

The amendment to Article IV of the existing Convention deleted the exception with regard to the discharge of residue arising from the purification of fuel oil or lubricating oil.

The amended text of Article V still provides a twelve-month period for ships to undergo appropriate changes to oil drainage and bilge systems. It should be observed, however, that the present permission for discharge of lubricating oil which has leaked from machinery spaces was eliminated.

The amendment to Article VII merely provided a consistent use of the term "oil" in accordance with the definition in Article I.

With respect to the Oil Record Book, the amendments to Article IX provided for an expanded, yet simplified and precise record to account for all oil received and discharged. It is significant that entries now must be made on a "tank-to-tank" basis.

The amendment to Article X provides for the prompt reporting of action taken as a consequence of a Government receiving evidence that a provision of the Convention has been violated by a ship of its flag.

Annex A of the existing Convention setting forth the prohibited zones was deleted by the amendment in view of the new provisions concerning discharge in revised Article III.

The Annex to the 1969 amendment sets forth the revised format for the Oil Record Book. That covers the 1969 amendments to the 1954 Oil Pollution Convention.

The first of the 1971 amendments to the Convention applies the distance from land criterion for discharges of oil and oily mixture to the area of the Great Barrier Reef as if it were land. The Convention amendment reflects the deep concern of the Australian Government that the Reef should be preserved in its natural state free from pollution caused by oil discharges from ships.

The other 1971 amendments relate to the arrangements of vessel tanks and limitations of tank size for new tankers. The theoretical objectives of those amendments are to place an upper limit on the quantity of oil which can escape into the sea as a result of collision or other vessel casualty. A proposed Annex C to the Convention would make formulae available for design computations in connection with tank arrangements and size for tankers built subsequent to the effective date of the amended Convention. Also, certain ships even now under construction would have to comply with the tank arrangement and size limitations within two years after the date the Convention comes into force. That provision would apply to tank vessels presently under construction that will be

completed after January 1, 1977 and to vessels completed before that date but which started after January 1, 1972.

The proposed Annex C contains an ultimate oil tank size limitation in that it declares that the hypothetical oil outflow, calculated in accordance with the formulae of Annex C, shall not exceed 30,000 cubic meters for vessels up to 420,000 deadweight tons and 40,000 cubic meters for vessels over 1,000,000 deadweight tons. The limit is a function of the vessel size between 420,000 and 1,000,000 tons. For all tank ships there is a maximum limit on the length of each tank which is a function both of ship length and tank arrangements.

GREATER DEGREE OF CONTROL PROVIDED BY THE AMENDMENTS

The 1969 and 1971 amendments provide the potential for a much greater degree of control of pollution of the sea than the existing 1954 convention. These amendments represent another important step both in the solution of the ocean pollution problem and toward the goal of eliminating harmful discharges of oil into the world's oceans.

Mr. Chairman, as there will inevitably be some time lapse before the new convention, which is expected to be developed this fall, can come into force, I urge the implementing legislation for the 1969 and 1971 amendments (S 1067) be acted upon as soon as possible. During recent IMCO meetings the U.S. delegation has been repeatedly asked the status of the 69 and 71 amendments in the United States. It is our feeling that if the United States deposits the instruments with IMCO before the fall conference convenes it will be a positive example of our intent to arrest the growing pollution of the oceans and a showing of good faith before the international community.

THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

The international conference for the Prevention of Pollution from Ships will convene in London in October of this year. Its purpose as you know is twofold:

- (1) to prepare a new International convention for the Prevention of Pollution from Ships; and,
- (2) to extend the 1969 International Convention to include substances other than oil.

This Convention will supersede the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended. In replacing the 1954 Convention, the new Convention goes beyond the original Conference's scope. Its broad objective, as stated by IMCO Assembly Resolution A.237 (VII) is "... the achievement by 1975 if possible, but certainly by the end of the decade, the complete elimination of the willful and intentional pollution of the seas by oil and noxious substance other than oil, and the minimization of accidental spills. . . ." In addition, it is intended to have a Convention which is both enforceable and easily amendable. The United States' position in the preparatory work has consistently been one which favors a strong, uniform, comprehensive, and enforceable Convention.

THE DRAFT INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

The fifth draft of the Convention, produced last winter, will be the basic working document for the Conference. It represents nearly two years of work on an international level and involved both government and private groups and individuals. In the United States, the Coast Guard through its role of Chairmanship of various national committees was the lead agency in the preparatory work. We have been and continue to be ably assisted throughout this venture by participants from the Department of State, the Department of Defense, elsewhere in the Department of Transportation, the Council on Environmental Quality, the Environmental Protection Agency, the Maritime Administration and various industry and environmental groups, and the Congress and its staff. The Convention as presently drafted and apart from the draft protocol relating to intervention on the high seas in cases of marine pollution by substances other than oil; has three main subdivisions: the Articles; the technical Annexes with their appendices; and, a series of resolutions.

The Articles essentially consist of the general obligations to which signatories to the Convention subject themselves to upon signature, ratification, and deposi-

tion of an instrument to that effect with the Organization. Included in the Articles are issues such as applications, powers of contracting states, enforcement, reservations, amendments, and deposit and registration. With respect to the issue of enforcement, the present draft has been developed along the lines of flag state enforcement. The United States, however, has gone on record supporting the concept of port state enforcement as well.

As one might expect, the bulk of the draft is vested within the second main subdivision; namely, the technical annexes and their appendices. Annex I with its three chapters and three appendices pertains to Regulations for the Prevention of Pollution by Oil. Annex II governs noxious substances other than oil while Annex III speaks to harmful substances in packaged form, cargo containers, or portable tanks. Annexes IV and V cover the subjects of sewage and garbage respectively.

Probably the most far reaching portions of the technical annexes are contained within Annexes I and II. Moreover, these are the annexes which in the interest of protection of the marine environment directly affect standards for design, construction, and alteration of vessels carrying oil or other hazardous polluting substances in bulk. These matters directly reflect those of Title II of the Ports and Waterway Safety Act of 1972 (P.L. 92-340) which had its inception within this very Subcommittee of the United States Senate. The major issues which no doubt are of interest here today and which are contained within Annex I pertain to the definition of oil (Regulation 1), the control of the discharge of oil (Regulation 9), and segregated ballast oil workers (Regulations 11 and 13). In terms of the definition of oil, the United States has favored what is referred to as the "broad definition" of oil. That is, an all encompassing definition which is in concert with that contained within the Federal Water Pollution Control Act, as amended. The 1954 Convention spoke only to persistent oil such as crude oil and lube oil. We were also confronted with a minority viewpoint at the last preparatory session in London to consider a definition which would differentiate between persistent and non-persistent oils or "black" and "white" oils if you will. In conjunction with this proposal is the concept that given this two-category definition of oil, one must then postulate dual design criteria and dual operational discharge standards for the two-categories of oil respectively within the Convention.

Regulation 9 which is the control of discharge of oil is at least in essence, the 1969 amendments to the 1954 Convention. In fact, however, it in the majority text requires that new tankers of 100,000 deadweight or more be limited to a total quantity of cargo discharged to 1/30,000 versus a figure of 1/15,000. If these fractional limitations strike you as small let me put them in perspective for you. A letter of intent was recently signed for a 706,000 tons deadweight tanker to be built overseas. One fifteenth thousandth of that deadweight is 47 long tons per voyage or approximately 14,100 gallons of oil.

In addition to the total discharge per voyage limitation, some delegations among which was the United States, voiced a minority view at the last preparatory session that the minimum distance from land specified be increased from 50 to 100 nautical miles and that the instantaneous rate of discharge of oil content be limited to 30 litres per nautical mile versus the existing figure of 60.

With regard to segregated ballast on oil tankers, paragraph 11(2) of the existing draft text makes this feature mandatory only on tankers in excess of 150,000 tons deadweight and on combination carriers in excess of 100,000 tons deadweight. Moreover, Regulation 13 does not prescribe the manner in which this segregated ballast capacity is to be achieved. Several delegations, including the United States, did favor specifying double bottom construction from both the view points of an anti-pollution measure in the event of grounding and their favorable cost differential per quantity of oil pollution abated. It would be presumptuous of me to predict the final outcome of this issue at the October Conference. I daresay it is one of the most controversial.

Paramount to the issue of segregated ballast are the questions of dates of application and the size limitations to which it would apply. The present draft of the Convention speaks of building contracts on or after 1 January 1978 or delivery on or after 1 January 1981. We of the United States delegation expressed our view at the preparatory session that these dates were inconsistent with the very objectives of the Conference as stated in Assembly Resolution A.237(VII) and Recommendation 92 of the Stockholm Conference. Our specific suggestion to the preparatory session was to substitute the dates 1 January 1976 and 1 January 1979 respectively as being more appropriate. Moreover, those dates would be in consonance with our own national legislation in the form of P.L. 92-340.

The size limitations, which admittedly are tentative, are in our opinion too high at 150,000 tons deadweight. We would think that a lower limit should be attained at the Convention.

National and international shipping interests while supporting segregated ballast as presently contained in the draft will not support mandatory double bottoms.

Nonetheless, the Coast Guard after participating in and reviewing an exhaustive study concerning segregated ballast had previously concluded that tankers incorporating the segregated ballast double bottom feature prevailed from a cost/pollution abatement point of view.

We subsequently drafted a note to IMCO in December of 1972 setting forth a proposal with respect to facilitating the treatment of the vessel source pollution problem through the segregated ballast double bottom concept. This note was discussed with the U.S. SOLAS Working Group. The Maritime Administration, the Environmental Protection Agency, the Council on Environmental Quality, the Office of Management and Budget and the Department of State were also briefed on this note before presenting it to IMCO. Concurrently, an advance notice of proposed rule making was published in the Federal Register of 26 January 1973 (Vol. 38, No. 17) with two paramount purposes in mind:

(1) Compliance with Section 201(7) of Public Law 92-340 with regard to early publication; and

(2) The solicitation of comments from all sectors of the public.

Over 60 comments were received on the proposal. As might be expected the comments to such a far-reaching proposal involved much more than simple expressions of support or nonsupport. Three primary areas of concern appeared with a fair degree of commonality in the comments. These were: (1) High initial cost associated with double bottoms; (2) the need for international agreement and the danger of unilateral action; and (3) the treatment to be accorded foreign and domestic shipping not covered by the proposal.

In regard to the high initial cost associated with double bottoms, we feel that the differential cost of incorporating a double bottom as a means of achieving segregated ballast is an important issue. However, this cost must be weighed against the protection to the environment which it affords. These costs must also be weighed in terms of whether the concept is internationally applied or not. The economic implications or the conclusions reached will be quite different depending on whether the requirement is based on multilateral or unilateral action.

We concur that there is a great need for international agreement in the areas under discussion. We are striving with many other agencies and individuals, both within and without the United States Government, to seek a strong and enforceable international convention to further our environmental aims and to alleviate the necessity for any unilateral action on the part of the United States. To this end the Commandant of the Coast Guard, Admiral Bender, acting in his capacity as Chairman of the National Committee on the Prevention of Marine Pollution, has formed a task group under that Committee to prepare the necessary positions and documents for the United States at the October Conference. The Department of State has concurred with this task group's concept. This task group, of which I have been designated as Chairman, has three members of the Coast Guard staff working full time along with other members of the Coast Guard staff on a part time basis as well as participants from the Department of Defense, the Department of State, the Environmental Protection Agency, the Council on Environmental Quality, elsewhere in the Department of Transportation, and the Maritime Administration. Preliminary discussions have already been conducted with industry, environmental, and other interested groups soliciting their comments and inputs to the final United States positions at IMCO in October.

The matter of treatment of existing foreign and domestic vessels is one that must be considered but as of this time is an unresolved issue, both in our national proposal and in the latest draft of the forthcoming convention. The draft convention has a "grandfather" provision for existing vessels. It is our hope that the coming Conference will realistically address this issue.

Apart from the question of the competitive disadvantages which could arise with the "grandfather" arrangements within the fifth draft of the convention, existing vessels will be required by that draft to: (1) Operate with improved "load-on-top" techniques; (2) have minimum "slop tank" capacity; and, (3) be equipped with certain oil monitoring and control equipment.

Our task group is especially examining the area of existing vessels with a view toward assessing the availability and feasibility of the oil monitoring equip-

ment. This equipment in our opinion, is the key element in the system from the point of view of control and enforcement.

Annex II, which concerns itself with noxious substances other than oil, was developed around a GESAMP (Group of Experts on the Scientific Aspects of Marine Pollution) hazard evaluation. This annex establishes quantitative limits on the amount of regulated substances which can be discharged and insures that any permitted discharge is done in such a manner as to preclude any harmful level of discharge. Annex II, I might add, will be the vehicle by which the IMCO recommended Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk will be implemented.

Overall, the fifth draft is replete with minority opinions in the form of footnotes and issues contained within "brackets" which must be resolved prior to the October Conference. Much work is yet to be accomplished here in the United States in the form of positions, alternatives, "fallback" positions, technicalities, etc. prior to October.

We are hopeful that a strong, comprehensive, and enforceable convention with realistic dates of application encompassing the United States' position will result, thus obviating the necessity of resorting to unilateral action. Our task group is working toward that goal.

At the risk of being repetitive, we certainly recognize the undesirability of unilateral action as, I believe, did the drafters of Title II of the Ports and Waterways Safety Act of 1972. We look upon Title II as the enabling legislation necessary to give effect to the results of this forthcoming international conference providing, of course, its results will meet the intent of our national legislation.

The Intervention Convention relating to intervention on the high seas in cases of oil pollution casualties, 1969, authorizes necessary measures on the high seas to prevent, mitigate or eliminate grave and imminent danger to the coastline or related interests of the United States from pollution or threat of pollution of the sea by oil which may reasonably be expected to result in major harmful consequences. The interests protected include fish, shellfish and other living marine resources, wildlife, coastal zone and estuarine activities, and public and private shoreline and beaches.

The Convention incorporates an elaborate system of consultations before undertaking intervention. While those consultations could be considered an impediment to effective action, there is express recognition of the fact that, in cases of extreme urgency, the coastal state may have to take action without prior notification or consultation, or while consultations are still in progress. Thus, while the actions authorized are most carefully circumscribed, latitude is afforded for prompt intervention in appropriate circumstances.

The Convention also provides a measure of damages for excessive intervention action. The United States will be obliged to pay compensation to the extent that damage is caused by activity which exceeds those measures reasonably necessary. Article VIII of the Brussels Intervention Convention provides for conciliation or, if conciliation does not succeed, arbitration as provided for in the Annex to the Convention. The October Conference as I mentioned earlier is expected to extend this Intervention Convention to include substances other than oil.

We consider that S. 1070 affords an excellent basis for any intervention which may be necessary to protect United States interest without unduly exposing maritime interests to arbitrary or capricious actions. We consider S. 1067 which contains the 1969 and 1971 amendments to the 1954 Convention to provide a much greater degree of control of pollution of the sea than presently exists in national legislation. We urge this Subcommittee to report favorable on both these bills and hope for their early passage; hopefully, before the Conference convenes in October.

Mr. Chairman, this concludes my prepared remarks. My accompanying staff and I will be happy to attempt to answer any questions which you may have.

Thank you Sir.

STATEMENT OF WILLIAM C. SALMON, DEPUTY DIRECTOR, OFFICE OF ENVIRONMENTAL AFFAIRS, DEPARTMENT OF STATE

Mr. Chairman and members of the Committee: It is a pleasure for me to appear before you today to testify on behalf of three bills: S. 1067, a bill to amend the Oil Pollution Act of 1961 in order to implement the 1969 and the 1971 amendments to the 1954 International Convention for the Prevention of the Pollution of the Sea by Oil; S. 1070, a bill to implement the 1969 International Convention

Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties; and S. 1351, a bill to amend the Marine Protection, Research, and Sanctuaries Act of 1972.

These bills signify to others the willingness of the United States Government to amend its domestic legislation in order to comply with international agreements on marine pollution and to promote international cooperation on matters of the environment.

The 1969 and 1971 amendments, to which S. 1067 refers, were drawn up in the wake of the Torrey Canyon disaster of 1967, in which that oil tanker, grounded off the southwest coast of England, released massive quantities of oil into the sea, polluting British and French beaches, flora, and fauna. The amendments represent significant progress toward prevention and control of such incidents.

This proposed legislation was motivated by four sets of amendments to the 1954 Convention for the Prevention of the Pollution of the Sea by Oil. The amendments were duly adopted by the Assembly of the Inter-Governmental Maritime Consultative Organization in 1969 and in 1971.

The first set of amendments, adopted in 1969 provides for more rigid controls over the discharge of oil and oily mixtures by tanker vessels so as to minimize intentional pollution of the seas. They impose strict requirements upon discharges permitted under the convention by setting specific rates of oil discharge, limiting the maximum oil content of the discharge, and limiting the total quantity of oil which may be discharged by ships on ballast voyages.

There are three sets of 1971 amendments. These provide for (1) the extension of the rigorous limitations on oil discharges prescribed by the Oil Pollution Convention to the Great Barrier Reef, an ecologically sensitive and unique area off the northeastern coast of Australia, by a redefinition of the designation "nearest land", (2) requirements for the design of super tankers through limitations on the volume and dimension of tanks, the location of center and wing tanks and their construction and associated equipment so as to minimize the potential outflow of oil from these large ships in the event of a collision, stranding, or other casualty and, (3) the assessment of civil penalties in addition to the criminal penalties to which the Oil Pollution Act of 1961 is limited.

The Department of State believes that the implementation of these amendments is a very important part of the programs of both the United States and the Inter-Governmental Maritime Consultative Organization, in creating a widely observed international system for the prevention of pollution of the seas by oil.

The second bill, S. 1070, known as the Intervention on the High Seas Act, would implement the 1969 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties to which the Senate gave advice and consent on September 20, 1971. The Convention permits a coastal nation to take any necessary action to prevent, mitigate, or eliminate a threat of oil pollution resulting from a maritime casualty beyond that coastal State's territorial sea, the authority of which is subject to several safeguards. The Convention also addresses some international problems, of the type which arose following the Torrey Canyon disaster.

The bill places the authority for action in the Secretary of the department in which the Coast Guard is operating. In appropriate circumstances, actions could be taken against United States and foreign vessels. Exercise of that authority is conditioned by the requirement for an express determination by the Secretary that there exists a "grave and imminent danger to the United States from pollution or threat of pollution of the sea by oil." The bill provides necessary regulatory authority for the Secretary and sanctions for the effective enforcement of that authority.

The Secretary would be authorized to use the revolving fund established pursuant to the Federal Water Pollution Control Act as one means of funding extraordinary Federal activities under the bill. The revolving fund is now available for Federal clean-up of oil and related activities, in areas subject to United States jurisdiction. Activities on the high seas under this bill will be similar.

No effort is made in the Convention or in this bill to articulate the various types of actions which could be taken. It is not possible to define all the possible incidents because their specific nature may become known only as an emergent situation develops. Under those circumstances, the full exercise of Executive Branch discretion should be available. At the same time, however, the Convention and the proposed bill contain a number of constraints to assure that the

Secretary's actions will be reasonable under the circumstances. Some specific criteria upon which actions must be based are included.

The Department of State supports this legislation, which will provide the United States Government with the domestic legal authority necessary to complete its ratification of the 1969 Intervention Convention. We believe that the entry of this Convention into force is an important step in enabling the United States and other coastal nations to take actions necessary to prevent or mitigate serious oil pollution damage resulting from maritime casualties on the high seas.

The third bill, S. 1351, would amend the Marine Protection Research, and Sanctuaries Act of 1972 (PL * 92-532), in order to implement the provisions of the international Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. I would like to provide this Subcommittee more detailed information on this bill as this topic has not been reviewed in such depth by other witnesses.

The President's communication to the Senate (Executive C, 93rd Congress 1st Session of February 29, 1973) requesting advice and consent to ratification of the Convention includes the full text of the Convention, the report of the United States delegation to the 30 October 13-November 1972 London Conference and the report by the Secretary of State, which provides an article-by-article analysis of the Convention. Hearings on the ratification of the Convention were scheduled for June 20, 1973, before the Senate Foreign Relations Committee. The Convention will enter into force thirty days after fifteen instruments of ratification have been deposited.

I would like to briefly note the steps this Department took regarding this Convention in following its implementing guidelines¹ for environmental impact statements covered under Section 102(2) (C) of PL 91-190, The National Environmental Policy Act. A draft environmental impact statement was prepared and made available on October 11, 1972. Comments were directly solicited from all concerned Federal agencies and from appropriate officers of governments of all coastal states of this country. On October 26, 1972 a public hearing was held on the draft impact statement. A final environmental impact statement was completed and notice of its availability appeared in the February 9, 1973 Federal Register.

At the present time, 47 nations have signed the Convention since it was open for signature on December 29, 1972. I am submitting for the record a list of the 47 nations for the information of this Committee.

On the specific provisions of S. 1351: to begin with, the 1972 Act does not apply to oil within the meaning of Section 11 of the Federal Water Pollution Control Act. The Convention, however, includes on its list of prohibited materials "crude oil, fuel oil, heavy diesel oil, and lubricating oils, hydraulic fluids, and any mixtures containing any of these, taken on board for the purpose of dumping." Therefore, to make certain that the United States has the authority to control the dumping of such substances, Section 1 of S. 1351 amends the 1972 Act to cover any oils taken on board a vessel or aircraft for the purpose of dumping.

Secondly, the 1972 Act only applies in three types of situations: (1) where waste material is transported from the United States for the purpose of dumping it into ocean waters; (2) where the dumping occurs in the territorial sea or contiguous zone of the United States; and (3) where an employee, agent or department of the United States transports materials from any location outside the United States for the purpose of dumping. However, the Convention requires, in addition, that each Party apply appropriate controls over dumping activities by all vessels and aircraft registered in its territory or flying its flag, even though the loading or dumping operations may have occurred outside its jurisdiction. This provision is in line with the responsibility of each flag state to see that its flag vessels take reasonable steps to protect the environment wherever they may go.

To accommodate this requirement of the Convention, S. 1351 makes two changes in the language of the 1972 Act. Section 2 of the Bill adds two new subsections to Section 101 of the Act to control the loading of wastes in a foreign country by a United States flag vessel or aircraft. Section 3 grants to the Administrator of the Environmental Protection Agency the authority to grant the necessary permits in such cases for the dumping of wastes other than dredged material, and to the Secretary of the Army, acting through the Corps of Engineers, for the dumping of dredged material. Where the loading occurs in the territory of

a country which is a party to the Convention, the appropriate authorities of that country would grant the necessary permits.

Finally, Section 4 of the Bill amends Section 109 of the Act to take into account the fact that a suitable convention for the worldwide control of dumping has now been concluded. The new Section 109(a) requires that the provisions of the Act be construed in a manner consistent with the Convention, so that United States courts and agencies will impose controls which are at least as strict as those contained in the Convention. The new Section 109(b) expresses support for effective international action by the United States to see that the requirements of the Convention are carried out.

As a final point, I would like to direct the Committee's attention to one difference between the Convention and the domestic legislation, which has given rise to several questions. I am referring to the situation in which the Convention prohibits in its Annex I, the dumping of a number of substances including chemical and biological warfare agents and high-level radioactive wastes with the exception that under emergency circumstances and after consulting certain Parties a special permit may be granted. Our domestic legislation prohibits under any conditions the dumping of chemical and biological warfare agents and high-level radioactive wastes. As the international Convention is specifically designed to be a floor above which any Contracting Party may establish more strict measures, there is no conflict on this matter between the Convention and our existing domestic legislation. The combination of our legislation and the Convention would prohibit the Administrator of the Environmental Protection Agency from granting permits under any conditions for the disposal of chemical and biological warfare agents or high-level radioactive wastes. The Administrator of EPA could grant permits for the disposal of the other substances listed in Annex I of the Convention only by invoking the rights granted in paragraph 2 of Article V of the Convention, the emergency clause.

Thank you, Mr. Chairman. I believe I have covered the major items of interest to the Committee and I will be most happy to respond to any of your questions.

STATEMENT OF THE ENVIRONMENTAL DEFENSE FUND, FRIENDS OF THE EARTH, NATURAL RESOURCES DEFENSE COUNCIL, NATIONAL PARKS AND CONSERVATION ASSOCIATION, AND THE SIERRA CLUB ON INTERNATIONAL REGULATION OF SHIP-GENERATED POLLUTION

Mr. Chairman, I am Eldon Greenberg of the Center for Law and Social Policy, a public interest law firm. I appreciate the invitation to appear before the Committee today to provide the advice of the Environmental Defense Fund ("EDF"), Friends of the Earth ("FOE"), the Natural Resources Defense Council ("NRDC"), the National Parks and Conservation Association ("NPCA") and the Sierra Club with regard to the proposed International Convention for the Prevention of Pollution from Ships, 1973 (the "Convention") currently being prepared by the Intergovernmental Maritime Consultative Organization ("IMCO"). My colleague, Richard Frank, and I have acted as counsel to these groups on environmental matters in the past, and we have been asked by them to coordinate the presentation of their views on the important issues of environmental policy raised by the Convention.

The environmental groups which I represent are all national organizations deeply concerned about the preservation and protection of the marine and coastal environment. They are non-profit, membership organizations with a combined membership exceeding 200,000 persons throughout the United States. All groups, further, have made substantial efforts in the past to improve the quality of the marine and coastal environments by means of litigation, testimony, policy analysis and educational programs. In particular, in recent months, EDF, NPCA, and NRDC have been actively participating in the development of, and have commented upon the Environmental Impact Statement prepared by the Department of Commerce regarding its program to subsidize the construction of oil tankers in the United States. Additionally, these organizations (a) have submitted comments to the Coast Guard on its proposal to require segregated ballast systems, including double bottoms, on all tankers trading in U.S. navigable waters, and (b) have testified before Congress on deepwater port development policy. With regard to international regulation of oil pollution, the Sierra Club, EDF, and NRDC submitted comprehensive comments on the Fourth Draft of the Convention in January of 1973. Finally, these groups have participated on

the Secretary of State's Advisory Committee on the Law of the Sea and have presented views on U.S. policy regarding the Law of the Sea regime.

Before addressing the substance of the Convention, Mr. Chairman, I would like to express the deep appreciation of my clients for your pervasive interest in, and concern about, marine pollution issues. Too many members of Congress have assigned low priority to the ocean environment; you and your staff, on the other hand, have played a significant and influential role in the formulation of U.S. policy. We depend on your objective involvement, and we thank you for it.

I. CURRENT STATUS OF THE CONVENTION

As you know, the Convention, which was released in its Fifth and Final Draft version in March of 1973, would (1) establish discharge limitations for oil, chemicals, hazardous substances in packages or containers, sewage and wastes from ships; (2) impose ship design and construction requirements to ensure that such limitations are met; and (3) provide hopefully, for enforcement against violators by affected "port" and "coastal" states as well as by "flag" states.

The United States is now in the process of preparing formal comments on the Fifth Draft of the Convention to be circulated to other IMCO members no later than June 30. The international conference at which the terms of the final Convention will be hammered out is scheduled to be convened the beginning of October in London. We understand that it is the intention of the Government to issue an environmental impact statement regarding the proposed Convention prior to August 15. Thus, the next few months will be very busy ones during which the final United States negotiating positions for the October conference will be developed and during which, for the first time, the public at large will have an opportunity to become involved in the formulation of United States policy with regard to international regulation of ship-generated pollution.¹

Ship-generated oil pollution is clearly the most important environmental problem treated in the Convention. More than 45% of the annual 5 million tons of oil injected into the oceans from all sources can be attributed to ship operations, including operations of tankers, tank barges and non-oil carrying vessels. If, as is expected, imports of petroleum products grow, the amounts of oil pollution will tend to grow proportionately, and the threats to the United States coastline will be magnified. These threats, as this Committee knows well, are not just those associated with massive spills engendered by tanker accidents such as that of the *Torrey Canyon*, but also result simply from the normal ballasting, deballasting and tank cleaning operations of oil tankers, which account for approximately 70% of tanker-generated pollution.

The Convention has the potential for substantially reducing the risks of pollution by oil and other harmful substances. In theory, its purpose, as expressed in the Preamble, and as expressed in Resolution A.237(VII) adopted by the IMCO Assembly on October 12, 1971, is to achieve "the complete elimination of intentional pollution by oil and other harmful substances and the minimization of accidental discharge of such substances," by 1975, if possible, but definitely by 1980. However, if it is to achieve this goal it must provide for stringent and broadly applicable international standards. Most importantly, we believe that, if the Convention is to be acceptable to the environmental community, it must establish discharge criteria for polluting substances, reinforced by strict design and construction standards, which will work a real and substantial improvement in the marine environment. As presently proposed, however, the Convention appears to do little more than codify existing commercial standards among the major maritime nations, provides no incentive to *improve* such standards, and offers insufficient environmental protection.

With respect to ship-generated oil pollution, there is no question that the means are available to eliminate the intentional discharge problem. Unfortunately, they are not reflected adequately in the fifth draft of the Convention. We believe that, from an environmental standpoint, imposition of a uniform, no-discharge standard for all types of oil, accomplished through the requirement of incorporation of a segregated ballast/double bottom system, is a fundamental requirement for an effective Convention.

In addition to the fundamental need for adequate discharge and design standards, there are two other basic areas of concern which we have about

¹ We are now in the process of preparing comprehensive comments on the fifth draft which should be ready within the next few days, and I request the Committee's permission to submit these comments for the record as an attachment to this testimony.

the final Convention. If the Convention fails to establish adequate enforcement mechanisms or to provide for broad application of its provisions, its ultimate impact on reducing pollution of the oceans will be severely limited. Thus, the Convention must (1) provide for mandatory enforcement of the discharge and design and construction standards which it establishes and (2) provide for comprehensive regulation of ship-generated pollution, applying to the widest possible number of states, kinds of vessels and variations of situations.

II. THE CONVENTION MUST IMPOSE UNIFORM, MEANINGFUL DISCHARGE LIMITATIONS AND STRINGENT DESIGN AND CONSTRUCTION STANDARDS

The fundamental requirement of an effective Convention is the establishment of meaningful, uniform discharge criteria and stringent design and construction standards to guarantee that these criteria are met. Discharge limitations and design standards are intimately related. A discharge limitation may be little more than a pious platitude unless it is reinforced by technologically sound hardware. Reliance on procedures, such as the load-on-top procedure, for example, which depends upon such factors as crew skill and diligence, weather conditions, product type, and voyage length, is simply no substitute in most cases for a structural solution, such as that obtained by a segregated ballast requirement, to the discharge problem. For the same reasons, it is important that the choice of means to achieve discharge limitations not be left open to the Contracting States but be mandated by the Convention itself. With regard to oil pollution in particular—the most significant element of ocean pollution and the major focus of the Convention—we believe that it is essential to impose (1) a uniform discharge limitation for all types of oil, (2) a no-discharge limitation, and (3) a structural solution to the discharge problem, *i.e.*, imposition of a segregated ballast/double bottom requirement.

(a) One Discharge Standard for Oil

Although the Convention as now drafted provides for a single discharge standard for "oil or oily mixtures," which are broadly defined to include "petroleum in any form," there is substantial pressure to establish a dual standard, with "persistent" or black oils presumably being subject to more stringent controls than "non-persistent" or white oils. This proposal is environmentally unacceptable. White oils may evaporate faster than black oils, and their discharge may not always have the same visible effects as the discharge of black oils, *i.e.*, fouling of fishing nets, deposits on beaches, coating of birds and wildlife, etc. Nonetheless, the effects of white oil discharges may be subtler and ultimately more harmful for the environment, since these oils, which contain a higher percentage of aromatic derivative compounds than crude oils, will have greater toxic effects on marine biota.

The dangers associated with discharges of white oils are underscored by two further factors. First, white oils are ordinarily primarily carried in coastwise trades near sensitive bays, estuaries and coastal breeding grounds. Thus, merely as a result of trade routes, their discharge will tend to produce more deleterious effects than discharges of black oils on deep sea trans-oceanic routes which are less rich and biologically productive than coastal waters. Second, because white oils are more water soluble, discharges of ballast water and from oil-water separators will contain significant concentrations of potentially toxic materials. In sum, given the current state of knowledge about the effects of oil pollution on the marine environment, establishment of a dual discharge standard would be wholly unwarranted.

(b) Meaningful Discharge Criteria

To provide for the best possible protection of the marine environment, any discharge limitations established under the Convention should be lowest attainable with existing technology. The five Annexes to the Convention provide for specific discharge limitations on oil, chemicals, harmful substances which are packaged in containers, sewage and waste. The criteria will be the subject of intense debate at the October Conference. As presently proposed they are unacceptable. With respect to oil, in particular, the discharge limitations do little more than codify the existing outflow standards which are met through utilization of the so-called load-on-top method (currently employed on 75% of existing tonnage). For example, if the Convention were to permit the discharge of

1/30,000th of the cargo of a 300,000 dead weight ton "supertanker" (as is now proposed), this would mean that almost 10 tons of oil could be discharged per voyage, and, assuming 40% ballast, the effluent could contain 100 ppm of oil. These are not negligible amounts. As noted above, severe environmental damage can result from very low concentrations of aromatic derivative compounds in sea water. Moreover, permitting any discharge at all adds to the increasing accumulations of oil in the oceans. The National Oceanic and Atmospheric Administration recently reported that "oil globules . . . in massive proportions infect nearly 700,000 square miles of blue water from Cape Cod to the Caribbean Sea." *Mar Map Red Flag Report (No. 1), Fish Larvae Found in Environment Contaminated with Oil and Plastic* (January 18, 1973). If seaborne imports of oil to the United States and Western Europe and oil tanker traffic increase, as both government and industry project, the environmental degradation from oil pollution resulting from vessels and their operations will increase proportionately. "Not only will the probability of accidents increase . . . but pollution of the marine environment from normal tanker operations [is] also likely to increase." S. Rep. No. 92-841, 92d Cong. 2d Sess. 22 (1972). Thus, even with relatively low discharge standards, adverse environmental effects will result, and the accumulation of oil in the oceans will continue to grow.

As noted above the objective of the Convention is the "complete elimination of willful and intentional pollution of the sea by oil . . . to be achieved by 1975, if possible. . . ." Thus, the Convention should adopt if possible a "no discharge standard. At the very least, before any discharge standards are adopted, they must be justified environmentally—a task that has not even been attempted. The Convention should only establish discharge criteria which meet the following two conditions: (1) that conclusive evidence shows that it is not technologically feasible to reduce discharges below those levels, and (2) that conclusive evidence demonstrates that discharges at such levels are not harmful.

(c) *The Environmental Necessity for Segregated Ballast and Double Bottom Requirements*

As mentioned above, meaningful discharge limitations must be buttressed by stringent design and construction standards. The critical design issue to be discussed at the October Conference will be the proposal that all new oil tankers incorporate "segregated ballast systems." By eliminating the need to mix oil and water in wash cargo tanks, these systems are without doubt the most effective means for reducing damage to the marine environment from normal tanker operations. The United States has proposed that segregated ballast be required and that it be achieved, in part, through incorporation of a double bottom. Such a combination, which provides protection against accidental discharge caused by groundings—the most common cause of tanker casualty—as well as protection against operational pollution, is an environmentally sound approach. The double bottom—although not the segregated ballast proposal—has been rejected in entirety in the current draft of the Convention.

This Committee need hardly be told that, in the Ports and Waterways Safety Act of 1972, Congress found that, "existing standards for the design, construction, alteration, repair, maintenance and operation of . . . [oil carrying vessels] must be improved for adequate protection of the marine environment." In reaching this conclusion, Congress implicitly rejected the prevailing single bottom design for tankers and the traditional practice of utilizing cargo tanks for ballast and discharging oily water into the sea.

The segregated ballast/double bottom feature is precisely the kind of design and construction innovation which Congress intended to be developed and required. It is clearly superior to load-on-top methods or shoreside disposal—other alternatives proposed in the Convention. Indeed, to permit the use of load-on-top as an alternative to segregated ballast/double bottoms would amount to nothing more than to maintenance of the *status quo*. Thus, we believe that such a design and construction standard should be made mandatory on all vessels.

As it now stands, the segregated ballast requirement would only apply to oil tankers in excess of 150,000 dead weight tons and combination carriers in excess of 100,000 dead weight tons. These tonnage limitations are far too high and wholly without justification. Coast Guard studies have demonstrated that a segregated ballast/double bottom approach is cost effective down to ships as small as 20,000 dead weight tons, and, in point of fact, several tankers of both intermediate

and handy size are currently being constructed in the United States to meet this requirement. Moreover, from an environmental point of view, because load-on-top operations may not be able to be engaged in on smaller tankers, because they may be relatively ineffective, and because smaller tankers tend to carry cargoes with higher toxicity, segregated ballast and double bottoms are an environmental necessity for these vessels.

Not only do we believe that the segregated ballast/double bottom standard should be imposed on all ships, but we believe that the Convention should provide for application of this standard as soon as possible after entry in force. As you are aware, under the Ports and Waterways Safety Act, regulations protecting U.S. coastal waters are required to be in effect by January 1, 1976. Yet the present cut-off dates for compliance with new standards in the Convention are in the late 1970s and early 1980s. Not only do these cut-off dates fail to meet the objective of eliminating operational pollution by 1980 at the latest, but as a practical matter, they create a substantial likelihood that the requirements will be ineffective until virtually the year 2000. A recent survey by the Federal Maritime Administration shows that, as of January 1, 1973, there were 533 oil carrying vessels on order or under construction throughout the world, including 276 tankers over 175,000 dwt; and, that the world tanker fleet contained an additional 750 tankers, including about 230 supertankers, all built within the last four years. The survey also shows that virtually none of these tankers will incorporate double bottoms or a segregated ballast capacity. It is common knowledge that a worldwide shipbuilding boom is underway in order to meet skyrocketing demands for imported petroleum. If the applicable dates in the Convention are put off to 1980, it is likely that a substantial part of the capacity needed to serve world needs in the 1980-2000 period will be constructed prior to such time, and thus the entire purpose of the Convention will be undercut. We believe that the United States must advocate adoption of the earliest possible completion dates to trigger application of the Convention's design and construction standards.

III. THE CONVENTION MUST PROVIDE FOR MANDATORY ENFORCEMENT OF ITS PROVISIONS

Discharge and design standards will only be effective if they are enforceable. Indeed, the Convention is needed in part because of the failure of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, to provide for adequate enforcement mechanisms. If the Contracting States are given full discretion to enforce or to decline to enforce the provisions of the Convention, or if they are not required to investigate alleged violations, the environmental protective purposes of the Convention will be substantially undercut. As it now stands, much of the language contained in the Fifth Draft is in the alternative, providing for either permissive or mandatory enforcement of various provisions of the Convention. We believe that it is essential that the United States press for inclusion of the mandatory language and for the vesting of power to prohibit discharges, investigate casualties or suspected violations, and punish violators in both "flag states" and "port states."

A very brief summary of some of the provisions in which these issues arise will, I believe, help the Committee to understand the problem and our views of what the United States position should be. For example, Article 4 of the Convention spells out the penalties and jurisdictional criteria to be applied whenever a violation of the Convention occurs. This provision provides for prohibition of discharges of harmful substances in violation of the Convention under the law of the flag state and under the law of any other Contracting State when the discharge occurs within its "territorial seas." Leaving enforceability to the "flag" states, especially if the flag is one of convenience, *i.e.*, Liberia or Panama, would virtually guarantee that the Convention would not be fully enforced. Such a provision, therefore, is of paramount importance to the effectiveness of the Convention. To work well, however, it must, in effect, operate automatically. Language in one alternative now provides that proceedings must be brought if there is sufficient evidence to do so. There is substantial opposition to this alternative language, but we believe that if Contracting States merely have an option to prosecute then there will be no assurance whatsoever that the Convention will be enforced, and every effort must be made to oppose a watering down of this enforcement mechanism.

Control over ships regulated by the Convention is also essential to effective implementation. Thus, stringent action should be required when it is determined

that a ship does not have a valid certificate of compliance. At present, the Convention, in Article 5, provides that ships in violation shall not sail until they can proceed to sea without presenting "an unreasonable threat to harm to the marine environment." This is clearly not the optimal solution. Rather, an alternative requirement that a ship should not be permitted to sail "until the deficiency is corrected" provides far greater assurance of the protection of the marine environment. At the very least, permission to leave port should only be granted to proceed to the nearest repair yard available. Similarly, the Convention should provide for mandatory denial of access to ports and offshore terminals, except for repair purposes, when a ship does not comply with the Regulations.

A final element of the enforcement mechanism which should be specifically mentioned is the development of an appropriate evidentiary standard, in particular, with regard to oil pollution. Although there is unanimous agreement that such a provision is appropriate, the four alternatives suggested vary vastly in effectiveness. One alternative merely provides that evidence of "visible traces . . . shall be cause for investigation . . ." A second alternative even makes adoption of this evidentiary standard optional. A third alternative would require that it be "proven" that oil has been discharged. Only one alternative of the four presented makes evidence of "visible traces" in and of itself "sufficient to establish a violation of this Regulation," unless rebutted by evidence to the contrary. Obviously this is the strongest of the present formulations, for it places the burden of disproving an apparent violation upon the alleged violator.

IV. THE CONVENTION MUST PROVIDE FOR THE MOST COMPREHENSIVE POSSIBLE REGULATION OF SHIP-GENERATED POLLUTION

A final element of an effective Convention is the scope of its impact on ship-generated pollution. It is obvious that unless the Convention is comprehensive in scope and provides for application to the widest possible number of states and variations of situations, its ultimate impact on reducing pollution of the oceans will be severely limited. Broad application, I would emphasize, means not just that the Convention must apply to a large number of states and a large variety of vessels, but that it must apply without reservation and must leave open the option for Contracting States to establish higher standards—to provide for even greater protection—should they so desire. The most significant issues pertaining to expansiveness and inclusiveness are those relating to higher state standards, the kinds of ships and trades to which the Convention applies, the exemption of military vessels, and the taking of reservations.

(a) Higher State Standards

Whether Contracting States will be able to take stricter measures within their own jurisdiction regarding any matters covered by the Convention will be a central issue in October and deserves particular emphasis. Such a provision, in our view, is essential if the United States is to retain the flexibility to protect its own waters and coastlines and, in general, to allow for the broadest possible protection of the marine environment. As this Committee is well aware, Congress, in the Ports and Waterways Safety Act of 1972, has specifically mandated that the U.S. Coast Guard establish tank ship design and construction standards which are sufficient to protect U.S. coastal waters. Similarly, in the Federal Water Pollution Control Act of 1972, Congress has authorized the Environmental Protection Agency to set stringent discharge standards for United States waters. It need hardly be said that international agreements tend to be compromises and may not be stringent enough to meet our own environmental goals. It is thus obvious that if provision for higher state standards is deleted from the Convention the United States might be faced with the choice of rejecting the Convention or giving up its own commitment to the highest standards of environmental protection. Such a choice is simply unacceptable; provision for higher state standards must be included.

(b) Application to All Floating Equipment in All Trades

The definition of "ship" in Article 2 of the Convention now broadly applies to ships of "any type whatsoever" and includes "fixed and floating platforms." There is substantial pressure to narrow this definition to exclude vessels engaged in offshore exploration. Such exclusion would be exceedingly unfortunate.

As offshore exploitation of the oceans' mineral resources grows, pollution generated from submersibles, fixed towers, and floating platforms and other craft will become an increasingly serious problem. Indeed, most major oil polluting incidents off the United States coasts in recent years have been associated with operations of offshore drilling rigs in the Gulf of Mexico and the Santa Barbara Channel. The regulation by any future law of the sea regime of such equipment is speculative, and, at best, far in the future; even if the law of the sea conference is successfully concluded in the next two years, an additional period of years would pass before machinery is established and substantive rules on structure pollution adopted. It makes eminent sense to provide for regulation of all floating "structures" on the sea now and to do so in a single Convention whose focus is prevention of pollution (as opposed to promotion of ocean development.)

If the Law of the Sea regime now being negotiated ultimately covers structures, and if subsequent rules promulgated under the regime are preferable to the ones in the Convention, then, of course, the law of the sea rules can merely supersede the Convention.

Broad application of the Convention further requires that all ships be subject to its coverage, regardless of the trades in which they are engaged. Regulation 5 of Annex I now provides that only ships which are engaged on "international voyages" are subject to certification procedures. This is an undue limitation on the certification requirement. Ships which engage in coastwise trade but travel in international waters, because they engage on shorter voyages and enter many harbor areas during their lives, present at least as equal a threat of pollution as ships which engage in the long haul trades. Not only is a higher accidental risk associated with frequent entry into narrow, shallow and crowded harbor areas, but, additionally, operational discharges from tank ships in the coastwise trade, insofar as such discharges are made near to biologically sensitive bays and estuaries, pose grave environmental hazards.

(c) Application to Military Vessels

Military vessels represent a substantial portion of the world's fleet. Many such vessels are tankers which are equipped to carry fuels and other petroleum products. Article 3 of the Convention now exempts military vessels from its application. We believe that this exemption is inappropriate and unwise. Any legitimate concern by the Department of Defense could be accommodated if military vessels are made subject to the Convention's regulatory requirements, but are immune from the enforcement powers of foreign governments. There is no justification for these vessels, which are often not warships, and which may be engaged in trades which are virtually indistinguishable from those of commercial vessels, not to be subject to substantial restrictions with regard to their discharge of oil and other polluting substances.

I might add that traditionally, in the past, military vessels have been subject to the prescriptions of these conventions, but immune from foreign jurisdiction. In the last few years, the Department of Defense has undertaken a massive campaign to place itself outside all environmental regulation. It insisted that it be totally exempted from the Ocean Dump Convention and the World Heritage Trust Convention. When the United States negotiates environmental conventions now, a primary objective is that military vessels be subject to no rules or regulations; and foreign governs are led to believe that our country's highest priority is to see that its military be allowed to pollute at will.

(d) No Reservations

Whether or not a Contracting State may make reservations or not make reservations to the Convention is at present an open question. Article 14 currently contains two alternatives, one which provides for reservations and one which does not. It is obvious to us that if reservations can be made willy nilly, the force of the entire Convention is vitiated. If it is to be a strong Convention, it must contain a general prohibition against a state's making reservations both to the requirements of the Convention and to the mandatory and optional Annexes.

V. CONCLUSION

Ship-generated pollution is not a problem which is limited to any one country. An oil spill off the coast of West Africa can wash up weeks later on the beaches of New Jersey. A "Liberian" tanker may in fact be (and probably is) owned by

an American corporation. The United States' commitment to preservation of its own coastal and marine environment—a commitment expressed in numerous recent pieces of legislation, including the Ports and Waterways Safety Act, the Federal Water Pollution Control Act, the Coastal Zone Management Act and the Marine Protection, Research and Sanctuaries Act, to name a few—is contingent to a substantial degree upon worldwide commitment to the same goals. Even if the right unilateral regulation of our waters is retained, we will suffer if there are not strong international standards. Every effort must therefore be made to ensure that the October conference results in complete, enforceable and meaningful regulations for the control of ship-generated pollution.

Thank-you.

PASSED BY INTERNATIONAL COMMITTEE, APRIL 7-8, 1973; PASSED BY BOARD OF DIRECTORS, MAY 5-6, 1973

Whereas the oceans are an integral part of the earth's biosphere and react with the atmosphere, regenerating a substantial portion (70%) of the earth's oxygen by the photosynthetic process with plankton on or near the surface of the oceans; and

Whereas the oceans are important to man as a source of food and protein, and for recreational, aesthetic, ecological scientific and other values; and

Whereas man's information, data, and understanding of the oceans is incomplete, and much is unknown about the conditions and processes of the oceans, marine life, the marine environment, and the effect of pollution on these, and therefore development of ocean resources should proceed slowly and with care; and

Whereas the oceans are acutely afflicted with pollution from a multitude of contaminants which emanate from a variety of sources, both land based and marine, and whereas this pollution is global in nature affecting the entire marine environment; and

Whereas oceanographers and U.N. reports warn that marine pollution, if it continues unabated, seriously endangers the viability of life within the oceans and may result in the death of seas or large oceanic areas thereby endangering the survival of terrestrial species including man; and

Whereas the oceans' environmental quality has deteriorated from overfishing of ocean living resources, and it may further deteriorate with the exploration, exploitation, or development of marine mineral resources, such as oil, gas, and hard minerals; and

Whereas the existing law of the sea is based upon a fragmented, piecemeal approach to the control of pollution and the preservation of the marine environment, and there are inadequate provisions in international law for the control of marine pollution.

Whereas the United Nations will hold a general Conference on the Law of the Sea commencing in New York in November, 1973, which shall consider; *inter alia*, international law governing pollution of the oceans, the preservation of the marine environment, and the creation of new laws concerning the development of marine mineral resources; and

Whereas the Sierra Club's International Committee, and its Task Force on the Oceans, has considered the problems of the law of the sea with respect to pollution and the preservation of the marine environment, and has accepted a written report on these matters, *now, therefore, be it*

Resolved, that the Sierra Club favors international approaches, through bilateral, regional, or multilateral conventions and other international arrangements, to control pollution of the world's oceans, and to preserve the marine environment. It favors a strong international regime over the seas covering the maximum area of the ocean with comprehensive environmental controls and standards relating, among others, to marine pollution and overfishing, effective enforcement provisions and an equitable distribution of resources, which regime involves all the nations of the world. However, it favors such international controls to the extent they are not less stringent than the environmental laws or regulations of the United States or other countries, when the U.S. or other countries have jurisdiction under international law to validly enact and enforce environmental laws and regulations in excess of those in international law.

Resolved, Further, That the Sierra Club generally opposes unilateral claims over the oceans for environmental purposes as an ineffective method of controlling pollution and preserving the marine environment, except that such unilateral claims may be permissible only in exceptional emergency circumstances, provided

such action is consistent with preserving or enhancing marine environmental quality; and such a unilateral right, if any, should be stated in a multilateral treaty.

Resolved, Further, That if the coastal state is given jurisdiction over the ocean beyond the territorial sea or contiguous zone under the Geneva Conventions on the law of the sea, by establishing a new "economic resource zone" or patrimonial sea, then the coastal state should be required to act as a custodian for all nations to control pollution and preserve the marine environment; and the coastal state should be given primary, but not exclusive, environmental jurisdiction; but if the coastal state failed to enact or enforce minimum international environmental standards, then an international, environmental authority would have jurisdiction in the "patrimonial sea" for environmental purposes. This international environmental authority shall establish a plan for the oceans, set environmental standards and enforce the same. The coastal state, or regional arrangements of coastal states, may enact and enforce higher environmental controls and standards than the international minimum standards.

Resolved, Further, That the law of the sea should be expanded to clearly define pollution and to state a general obligation of all states not to pollute the oceans, to protect and preserve the marine environment, and to be liable and responsible for damage to the marine environment from pollution. These provisions should manifest a comprehensive, systematic, yet flexible, approach to life in the oceans and marine pollution, whether arising from land-based or marine sources, which approach is based upon scientific, ecological analysis. This also includes freedom of scientific research in the oceans to monitor and control marine pollution with free exchange of the fruits of such research.

Resolved, Further, That the Sierra Club is opposed to any international seabed treaty or regime governing the development of ocean mineral resources unless such treaty or regime contains stringent environmental provisions to prevent pollution and enhance and preserve the marine environment including but not limited to: (1) an environmental impact analysis before approving or licensing a project for the exploration, exploitation or development of ocean mineral resources and that such a project shall be approved only if it is consistent with enhancing or preserving the environmental quality of the oceans or any part thereof; (2) states and international organizations be given a right to seek review of any license to develop resources as to the proposed project's compliance with the regime's environmental provisions; (3) the elimination of the conflict of interest in promoting development and preserving the environment, which is inherent in many proposed regimes, such as by creating an Environmental Commission with persons of the highest competence in marine environmental and ecological matters to review each development project or by broadening the regime to include jurisdiction over matters other than marine mineral development; (4) provisions for guidelines to properly balance development and conservation consistent with the oceans environmental quality.

Resolved, That the Sierra Club takes no position at this time on the breadth of the territorial sea, contiguous zone, or economic resource zone because regardless of the breadth environmental protection is a necessary provision of each.

Resolved further, That the United States be required to analyze thoroughly the environmental impact of the United States' draft of a U.N. Convention on the International Seabed Area, dated August 30, 1970, and that a similar environmental analysis of the seabed proposals of the U.S. and other countries submitted to the U.N. should be performed by the U.N. Environmental Secretariat.

Resolved further, That the Sierra Club opposes the "flags of convenience" principle which weakens marine environmental controls, and it favors state responsibility of the state of registry of vessels causing pollution. It also favors stronger international methods of enforcing environmental laws and standards, including the application of the universality principle to marine pollution.

Resolved further, That the Sierra Club favors international conventions establishing international marine parks, preserves and sanctuaries in seas and oceanic areas of international significance, such as by an amendment to the Convention For the Protection of the World Cultural and Natural Resources.

SIERRA CLUB,
Mills Tower, San Francisco.

Memorandum Concerning Resolutions and Report of International Committee on the Oceans.

From: Lawrence R. Lanctot, Chairman, Task Force on the Oceans of the International Committee.

The International Committee's resolution, on the oceans, presently before the Board of Directors, are important for a number of reasons.

If the Sierra Club passes this resolution, it will be the first environmental organization in the United States to adopt a position on the issues concerning the law of the sea. While oceanographers and others have directed public attention to the problems of the oceans and marine pollution, there has been little response from environmental groups. The Sierra Club's support will contribute to the development of international law and institutions dealing with major problems of the global environment. This will continue the commitment and work just begun at the Stockholm Conference on the Human Environment.

The oceans stand at a critical juncture in world history. They are seriously afflicted with pollution which is distributed throughout the entire marine environment. At the same time, there are additional pressures to develop the mineral resources of the deep ocean, which may further impair the oceans' environmental quality. Marine pollution and other law of the sea issues have been studied by the United Nations for several years. The culmination of these studies will be a U.N. Conference on the Law of the Sea involving all nations which will begin in November 1973 and continue through 1974. At this conference, various proposals for changing international law will be adopted; and these proposals will have a significant impact on the oceans' environmental quality. To date the environmental issues have not been seriously explored. If the U.N. Conference does not adopt environmentally sound measures, it may be a long time before those measures, which become law, can be modified.

The timing of the Board's adoption of the resolutions is essential. There will be one last preparatory meeting in Geneva in July 1973 before the U. N. Conference begins in November. The Geneva meeting in July will be the *last time* that the Sierra Club can effectively present its views on the environmental impact of proposals and submit its own draft articles on the marine environment. If this opportunity is missed, the ability to influence the conference will be substantially diminished. Further, if the conference adopts environmentally unsound provisions which become part of international law, it may be many years before the slow moving processes of the international system can be prompted to change those provisions.

The resolution of the International Committee can be summarized as containing the following general principles:

1. The Sierra Club favors an international approach to control marine pollution and to preserve the marine environment provided the international controls do not weaken valid higher U. S. environmental laws and regulations.

2. The Sierra Club generally opposes unilateral claims over the oceans for environmental jurisdiction except in limited circumstances. Such claims may not be valid, and they may lead to a multitude of controls by different nations rather than a uniform universal standard. Although some countries may make unilateral claims for valid environmental reasons, such a right could easily be abused by other countries as a means of setting weak environmental controls or encouraging "pollution havens."

3. If the coastal state is given pollution control jurisdiction in certain areas of the ocean, it should be required to meet minimum established international environmental standards. However, the coastal state could set higher standards, a concept similar to federal-state water quality regulations.

4. The Law of the Sea Conference should clearly define marine pollution, state a general obligation of all countries not to pollute the oceans, and establish liability for damage from it. These provisions should set forth a comprehensive approach to marine pollution.

5. The Sierra Club is opposed to any new international institution to license the development of oceans mineral resources unless the treaty creating the institution contains stringent environment provisions to prevent pollution from that development. The U. S. Government should be required to analyze the environmental impact of its proposed seabed treaty.

6. The Sierra Club takes no position on the breadth of the territorial sea, contiguous zone, or economic resource zone. This is highly a controversial political issue in which the Club should not become involved, for from an environmental viewpoint the width of these zones can be considered arbitrary.

7. The Sierra Club opposes the "flags of convenience" principle. This is a technique for avoiding environmental controls by permitting regulation only by the state in which the vessel is registered. The Sierra Club favors stronger international methods of enforcing environmental standards.

8. The Sierra Club favors creating international marine parks, preserves and sanctuaries in oceanic areas of international significance.

ADDITIONAL BACKGROUND PAPERS FOR CONSERVATION AGENDA ITEM 2. LAW OF THE SEA

This is the report of the Task Force on the Oceans of the International Environment Committee.

I.—BACKGROUND ON CURRENT DEVELOPMENTS IN THE LAW OF THE SEA

The law of the sea is a part of international law governing the oceans which has developed through custom and treaties. The law of the sea was first formulated during the 16th and 17th centuries during the age of exploration. It continues today ; but due to many economic, political, and technological developments, the law of the sea today is undergoing rapid change and reformulation.

The changes in the law of the sea gained significant momentum in 1945 with President Truman's Declaration of the Doctrine on the Continental Shelf. Other subjects, such as the breadth of the territorial sea and fishing rights, were the subject of intense and controversial debates during the U. N. general conferences on the law of the sea at Geneva in 1958 and 1960. Some of those questions, as the breadth of the territorial sea, were never resolved in 1958 and 1960 ; and as a result, the breadth of the ocean over which a coastal state can exercise control is still disputed. The Latin American claims to 200-mile limits, the Canadian legislation to protect the Arctic environment within 100 miles of its Arctic shores, and the recent Icelandic legislation to protect fisheries within 50 miles of its coast are evidence of this continuing conflict. However, the breadth of the territorial sea is only one highly visible issue of the many questions concerning the change in the law of the sea. At stake also are proposals concerning the right of a coastal state to control pollution, fisheries regulation and conservation, the rights of scientific research, and others. In addition to revising old law, entirely new rules are being created such as the proposed international regimes to govern the exploitation of deep sea mineral resources, which, representing immense potential wealth, have been inaccessible until recent technological advances. Thus because of economic, political and technological changes, the law of the sea has been subject to intense pressures for reformulation since 1945.

In 1968 it was apparent that many of these issues were in need of resolution. In that year the United Nations appointed an ad hoc committee to study the peaceful uses of the seabed, which became the General Assembly Committee on the Peaceful uses of the Seabed and Ocean Floor Beyond the Limits of National Jurisdiction. The U. N. began to plan for its third general conference on the law of the sea. This conference is scheduled to begin in November, 1973 in New York, where procedural matters will be first discussed, and will then be continued in early 1974 in Santiago, Chile. It is expected that this conference may last several years.

Many of the suggestions for changing the law of the sea, and creating new ocean regimes, will have profound consequences for the marine environment. It is generally known that the oceans are acutely afflicted with pollution because they have been used as the ultimate receptacle and cesspool for disposing of materials. However, few groups, other than oceanographers and some citizens groups, are concerned about the environmental consequences of the developing law of the sea. To date most of the emphasis has been on the economic consequences of changing the law of the sea. There has been some discussion of marine pollution, but in general it has not received the attention that it deserves.

In view of the deteriorating quality of the oceans at a time when the law is changing, the Sierra Club has a unique opportunity to review the proposed changes in the law of the sea in order to assess their impact upon the oceans' environmental quality. This opportunity is unique because the Sierra Club, through its International Office of Environmental Affairs in New York, can seek to influence the formulation of policies of the United States, other countries, and international organizations so that marine environmental problems can be averted in advance through rational planning. By contributing to the development of environmentally sound legal regimes, the Sierra Club can avoid the disadvantages

of reacting to problems after they arise. The Sierra Club can have an impact on these developments which take place in the U. N. since it has been accredited as a nongovernmental organization before the U. N., and the New York office is in a position to offer the Club's viewpoints to the U. N., its various specialized agencies, and to the member countries. In this way the Sierra Club can attempt to influence various governments by making them aware of the problem of marine pollution and by convincing them that it is in everyone's interest to arrive at solutions which are environmentally sound.

II. PRIOR SIERRA CLUB INVOLVEMENT IN THE LAW OF THE SEA

The Sierra Club's attempt to formulate an overall policy on the law of the sea is consistent with its past efforts in this particular area. At various times the Club has made its views known on a number of international treaties affecting the oceans. It submitted testimony on the two 1969 Brussels conventions relating to intervention on the high seas to prevent a threatened oil catastrophe, and establishing civil liability of the \$14,000,000 for oil pollution damage from ships. It has also recently testified on amendments to the 1954 London convention for the Prevention of Oil Pollution of the Seas and the 1971 International Convention on an International Fund for Compensation for Oil Pollution Damage. Last year it testified on HR13094 concerning environmental problems of allowing the United States to unilaterally license seabed mineral development anywhere on the ocean floor. Thus the present report continues the Club's prior commitments to preserving the environmental quality of the world's oceans.

III. THE SCOPE OF MARINE POLLUTION AND THE OTHER DETERIORATION OF THE OCEANS' ENVIRONMENTAL QUALITY

There is little doubt that the oceans are subjected to intense and widespread pollution. This fact is evidenced by such incidents as the wreck of the Torrey Canyon, the blowouts of offshore wells in Santa Barbara and the Gulf of Mexico, the disposal of nerve gas on the high seas, the poisoning of edible marine species, such as sword fish and tuna, and the diminution of certain bird populations because of DDT.

Recent scientific observations show that pollution is not confined to discrete, limited local areas; but rather it is a problem of global dimensions affecting the entire marine environment. Thor Heyerdahl in the expedition of Ra II recorded continuous pollution of oil and other inorganic wastes at points far distant from land and concluded that this would have an irreparable effect on the survival of many species. Oceanographers warn that man is imposing a very serious, perhaps intolerable, strains on the ecological balance of marine life. Jacques Costeau warns that marine pollution has destroyed a significant portion of oceanic life in the last twenty years, perhaps as high as forty percent; and Jacques Piccard predicts death of life in all oceans by the end of the century if marine pollution is not soon abated.

While some may view such general conclusions somewhat skeptically, recent reports of the United Nations agencies confirm these general admonitions with detailed factual evidence. Thus the Food and Agricultural Organization of the United Nations has predicted the destruction of valuable commercial fisheries, including tuna, salmon, sturgeon and shrimp, unless immediate and drastic action is taken at the international level to control marine pollution. Other United Nations' reports warn that pollution may grow, not diminish, when marine technology is developed to permit a commercially profitable recovery of deep sea mineral resources, such as manganese nodules and other substances. The United Nations Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) has warned that certain chemicals in the marine environment must be given high priority for abatement because of their toxic, accumulative and persistent qualities and their widespread absorption in the chain of marine life. Finally, the Stockholm conference, which briefly studied these problems, recommended or endorsed certain principles calling for the control and elimination of marine pollution, but that conference left the resolution of those problems to the 1973 IMCO and U.N. conference on the law of the sea.

A detailed analysis or summary of each of these studies would be repetitive and unnecessary, and copies are attached for reference. It is clear from these reports, and the admonitions of oceanographers that marine pollution is a global problem which affects the entire marine environment. Pollution has so permeated the interrelated chain of marine life that the U.N. warns that it seriously

threatens "the continued viability of marine life." This poses serious threats not only to marine life but to terrestrial life as well since seventy percent of the earth's oxygen is replenished through the photosynthetic process with plankton in the seas. Apart from this danger, pollution also poses a threat to human health, to the survival of species, to amenities and recreational values, and to economically valuable food resources.

IV. THE PRESENT STATE OF THE LAW OF THE SEA

Under international law the seas have been regarded as the "commons" of mankind, an international waterway and area which is not subject to the control or appropriation by any single nation. This notion is reflected in the principle of "freedom of the high seas." However, the freedom in the international area of the oceans has been subject to certain limited controls of the coastal state for the protection of its security and for other purposes. Initially in international law the coastal state could claim a territorial sea of three miles to protect its security, that being the distance of a cannon shot. The area of the oceans which is subject to "national jurisdiction" by the coastal state has continued to enlarge from three to twelve miles, and, as some states claim, to a distance of 200 miles. Thus one of the basic problems in the law of the sea is the conflict and tension between international control and regulation and coastal state jurisdiction, and the resolution of this conflict may have an important bearing upon the effective control of ocean pollution.

The law of the sea is regulated to a large extent by the four 1958 Geneva conventions on the law of the sea, namely: (1) the Convention on the Territorial Sea and the Contiguous Zone; (2) the Convention on the Continental Shelf; (3) the Convention on Fisheries and the Conservation of Living Resources; and (4) the Convention on the High Seas.

Under these conventions the ocean is divided into various zones of jurisdiction which include: (a) internal waters; (b) the territorial sea; (c) the contiguous zone; (d) the continental shelf and (e) the high seas.

(a) Internal Waters: In internal waters, such as a bay or a river, the coastal state has absolute jurisdiction. This would include absolute jurisdiction to regulate pollution.

(b) The Territorial Sea: In the zone of the ocean known as "territorial sea," the coastal state has full and complete sovereignty, just as it does over its land, to regulate activities in that sea with one main exception. This exception is the right of innocent passage by other vessels through the territorial sea. Since the coastal state has complete jurisdiction in its area except for the right of innocent passage, it may regulate all activities, including those posing a danger to the marine environment such as pollution from tankers, overfishing, etc.

However, the basic question here is how far out this marginal belt of the sea extends. Under customary international law up until 1930, a majority of states authorized a territorial sea which extended no further than three miles from the coast. Since that time more and more states have abandoned the three-mile rule. Probably today the majority of states support a territorial sea of twelve miles from the shoreline. The United States still adheres to the old three-mile rule, but it is willing to adopt the twelve-mile limit if its naval vessels and submarines are assured a right of passage through international straits. Thus the trend in international law is toward a territorial sea of twelve miles.

A minority of states go even further and claim complete jurisdiction over the high seas to a distance of 200 miles. This includes approximately thirteen Latin American States. The number of these states is growing and is not confined to Latin America. Thus Nigeria has extended its territorial sea to 30 miles, and Iceland, to protect its fisheries, has recently extended its fisheries jurisdiction to 50 miles. At the 1958-1960 Geneva conferences on the law of the sea, no agreement was reached on the breadth of the territorial sea. This explains why so many states have abandoned the three-mile rule in favor of a twelve-mile territorial sea and why other states have gone even further in advocating a 200-mile limit. Whether a state can or should be allowed, under any newly created legal rules, to claim control beyond 12 to 200 miles is important from an environmental point of view; for it is in the area over the continental shelves that the ocean is most biologically rich and fertile and, unfortunately, it is also the most polluted area.

(c) The Contiguous Zone: Under Article 24 of the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone, the coastal state has limited juris-

diction up to 12 miles to protect certain restricted interests, namely, those relating to its customs, fiscal, immigration and sanitary regulations.

There is a very critical difference between the rights of the coastal state in its territorial sea and the contiguous zone. The essential difference is that in the territorial sea the coastal state has full sovereignty except for the right of innocent passage; but in the contiguous zone, the coastal state has jurisdiction limited to only the four mentioned purposes. Under the 1958 Convention the contiguous zone could extend no more than 12 miles from the shoreline. However, since the territorial sea, whose breadth was never determined in 1960, is being extended to 12 miles, it is clear that the contiguous zone will, if it survives, be extended to some point beyond 12 miles.

(d) The Continental Shelf: Under the 1958 Geneva Convention on the Continental Shelf, the coastal state has sovereign rights over its resources in the seabed and subsoil of the continental shelf. Under this convention, the coastal state does not have jurisdiction over the waters or living resources above the continental shelf, but it only has the rights to manage and develop the resources which lie on top of or beneath the soil of the continental shelf.

There is an inherent defect in this convention because of the ambiguities in the definition of "continental shelf" in article 1(a). Under article 1(a) the coastal state has jurisdiction over the seabed and subsoil: (a) to a depth of 200 meters or (b) to "where the superjacent waters admit exploitation." The definition of the "continental shelf" is thus not confined to the "geological continental shelf." Under the latter "exploitability test," a state may claim jurisdiction far out beyond the continental shelf to the point where it can exploit the resources. Carried to its logical conclusion, this would mean that a coastal state would have jurisdiction over the deep ocean floor far beyond the point where the continental shelf tapers off and touches the bottom or abyssal floor. There is a great debate among legal scholars as to whether the drafters of article 1(a) intended such a result. The two basic interpretations of article 1(a) are that it (1) is confined to a narrow shelf no more than the 200 meter isobath, or (2) that a coastal state has jurisdiction to the middle of the ocean which is equally distant from the opposite shores of another coastal state. This latter position was that initially argued by the oil companies and later modified by the National Petroleum Council. Certainly this definition of the continental shelf should be clarified under existing law because of the great dangers in permitting a coastal state to claim great areas of the ocean floor in the guise that it is within article 1(a) of the doctrine of the continental shelf.

(d) The High Seas: Under the 1958 Geneva Convention on the High Seas, the oceans are governed by the concept of the freedom of the seas. This means freedom of navigation, freedom of fishing, freedom to lay submarine cables and pipelines, freedom of overflight. In addition to certain rights of states, the convention also defines obligations with regard to pollution. Articles 24 and 25, require states to draw up "regulations" to prevent pollution of the seas by oil from ships or pipelines or exploring and exploiting the seabed or subsoil. Further, states are required to take measures to prevent pollution from the dumping of radioactive material and to cooperate with international organizations to prevent harm to the oceans from those materials or "other harmful agents." These two articles are primarily concerned with oil and radioactive materials. In addition they are largely ineffective as evidenced by the continued pollution of oceans since 1958. Finally, they reflect a piecemeal approach to the causes and control of marine pollution.

(e) Other Treaties Covering Pollution of the Seas: In addition to the four Geneva conventions setting out the zones of the sea, certain other conventions also are concerned with marine pollution. The 1954 London Convention on Pollution of the High Seas by Oil prohibits certain discharges of oil from ships within a zone of 50 miles from the coast, but this convention only pertains to discharges near the coast and not to oil pollution on the high seas. Although the convention is being amended to broaden that limited zone of protection, the amendment is not yet in force. Even if it does become effective, the convention is ineffective because enforcement lies only with the state of registry of the offending vessel. Such enforcement is highly unlikely because many states of registry are chosen largely because of the weak or nonexistent laws governing shipping.

In response to the Torrey Canyon incident, two other conventions were adopted dealing with pollution of oil by ships. These are the 1969 Brussels conventions which establish liability up to \$14,000,000 for certain oil spills from ships and also establish a right of a coastal state to intervene to prevent threatened pollution of its shores from such a catastrophe. However, these two treaties apply

only to pollution from ships and not to oil pollution arising from offshore drilling operations.

In addition, the Ocean Dumping Convention has recently been opened for signature. Since this convention has already been drafted, no comments will be made on it and the Sierra Club's position will largely be determined by subsequent analysis. However, it should be noted that this convention is generally regarded to be very weak; and it is not of widespread application since it only applies to dumping from ships and aircraft.

V. PROPOSALS, CHANGES AND TRENDS IN THE LAW OF THE SEA

A. Preliminary Considerations

Although the law of the sea involves many questions, current interest in the developing law centers around the extent of the coastal state to the control broad areas over the oceans and secondly the extraction and development of valuable mineral resources both on the continental shelf and on the abyssal ocean floor beyond the continental shelf.

Petroleum and natural gas are already being developed offshore on the continental shelf. Hydrocarbons are valued at 4 billion dollars, representing the most valuable ocean mineral resources and second only to the 8 billion dollar annual value of fisheries resources. As offshore production doubles to 30% of all petroleum extracted, there will be substantial increased dangers of offshore oil spills.

However, the principal interest is in mineral resources of the continental shelf and the deep ocean other than oil and gas. These include the mineral rich brines and muds of the Red Sea and manganese nodules which are found off the coast of Florida and at great depths of the Pacific Ocean. These hard marine minerals have been inaccessible because they either lie on top of the ocean floor or beneath them at great depths and are not easily recoverable. However, accelerating technology is perfecting sophisticated hydraulic and other dredging and mining techniques to extract these resources. These minerals are not insignificant, for they represent immense potential wealth. It is estimated that the development of manganese nodules could supply a large part of the world's needs for cobalt, manganese, copper and other valuable hard minerals.

The developed nations with advanced marine technology are interested in exploiting these resources; and in the United States several companies, such as Tenneco and Hughes Tool, Inc., have already begun building deep sea recovery vehicles. However, these resources have not yet been developed for several reasons. First, the technology has only recently been perfected. Secondly, the high cost of initial development and recovery has precluded commercially profitable operations. Thirdly, because of the ambiguities of the article 1(a) of the continental shelf, it is unclear who owns these resources or who has authority to issue permits to develop them. In many cases these resources do not lie within the confines of the narrow continental shelf. Rather, they exist on the deep ocean floor or in areas which are subject to claims by several states. It is because of this accelerating technology and these ambiguities in the law that the United Nations first became interested in the problem in 1968 at the suggestion of Arvid Pardo, the Maltese ambassador to the U.N.

In addition to the developing countries, the less developed countries are vitally interested in this question. They believe that if these resources are managed for the development of all mankind, not merely the developed nations, the less developed countries should share in any revenues derived from licensing this development in order to assist their economic development.

In 1970 the U.N., by Resolution 2750, called for a general conference on the law of the sea. The U.N. resolutions at that time and subsequently have declared that the resources of the ocean "beyond the limits of national jurisdiction" are "the common heritage of all mankind." The phrase "the national limits of jurisdiction" is vague, and the precise demarcation of the boundaries is left for determination by the conference. The "common heritage of mankind" doctrine implies a number of things. First, the U.N. resolutions declare that since the oceans are the "common heritage of all mankind," they are not subject to appropriation by any individual state. Secondly, the resolutions suggest that the oceans beyond the limits of national jurisdiction are to be governed by an international body. Thirdly, the resolutions declare that a portion of the revenues from this resource development shall be used for the economic development of the less developed countries. Many nations, including the United States, have submitted

detailed proposals for an international institution to license development of the mineral resources of the ocean.

This obviously represents a very critical juncture for the development of new international institutions and for the protection of the marine environment. Some have suggested that the coming U.N. conference on the law of the sea raises, not merely important issues, but some of the great issues of the century. If this conference does, as seems likely, suggest the creation of an international institution to regulate ocean mineral development, then sufficient environmental standards must be included to prevent further deterioration of the oceans' environmental quality. The creation of such institutions can be likened, in a constitutional sense, to the debates concerning the Articles of Confederation in United States history or to the creation of the League of Nations or the United Nations. The magnitude of this task can be fully appreciated by realizing the scope of such an institution. In terms of geographic area, an ocean resources development institution would have jurisdiction of nearly seven-tenths of the earth's surface. It would license resources which have both immense present and potential wealth. Finally, these resources, and consequently this agency, will become increasingly important as land based sources of mineral resources are depleted.

Another area of principal concern in the developing law of the sea is the extent to which the coastal state will have jurisdiction over the high seas. As mentioned, the old three-mile limit of the territorial sea has for all practical purposes been abandoned by a majority of states which now adhere to the twelve-mile limit. In addition, a number of other states in Latin America and elsewhere have claimed jurisdiction over the high seas to 200 miles. The conflict between the coastal state and international controls is also central to the protection of the marine environment. The question is to what extent should the coastal state be given authority, exclusive, primary or otherwise over the high seas to regulate and abate pollution. In addition to the territorial sea, the concept of the contiguous zone is being reformulated. Many are advocating the concept of a "partimoniaal sea," or "exclusive economic zone," in which the coastal state would have exclusive, or at least primary, jurisdiction to extract living and mineral resources, to control scientific research, and to exclusively control ocean pollution.

B. Issues for Sierra Club Policy Formulation

1. The Approaches to the Control of Marine Pollution

Pollution of the oceans can be controlled by actions taken at the national, regional, or international levels.

The coastal state under customary and conventional international law can regulate pollution which affects its territory or territorial sea. However, under the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone, the coastal state may not extend such controls beyond 12 miles. While the 12-mile rule probably represents a majority of states' practice, a minority of states unilaterally assert jurisdiction over the high seas beyond this point.

By its Arctic Waters Bill of 1970, Canada claimed limited jurisdiction, not sovereignty, up to 100 miles from its Arctic shores to protect the fragile Arctic ecology from oil pollution and other disasters. It is believed that such disasters may occur in transporting oil from the Arctic slope, and other northern regions, through the icy Northwest Passage. In addition to Canadian claims, a number of Latin American countries justify their 200-mile limits in order to conserve fishery resources. Peru's 200-mile limit is based in part upon the "bioma" or ecosystems theory. This theory is invoked to justify protection of the abundant, biologically rich ocean areas in the Humboldt Current, which, at its outer limits, lies 200 miles from Peru's shores. Many other states may follow the Canadian and Latin American approach by making extensive unilateral claims to the high seas upon finding environmental considerations, such as unique marine ecologies, to support such extended claims.

In the United States, the mining industry has introduced bills (HR13094 (1972), HR9 (1973)) which would provide for the unilateral appropriation of hard mineral resources by the United States. The Sierra Club opposed these bills.

Under present international law, there is doubt about the validity of unilateral claims by the coastal state over the high seas beyond 12 miles. Further, it may not be desirable from a policy view point to permit claims which would shrink the international area of the oceans and weaken the principle of freedom of the

seas by which all nations may use and enjoy to a maximum degree the resources of the world's oceans.

In addition to such considerations, unilateral claims over the high seas are objectionable from an environmental viewpoint for a number of reasons. First, while stringent environmental standards, such as Canada's are desirable, the question is whether other nations would, in the present absence of international minimum standards, adopt measures as strict as Canada's. Other states may not have the same degree of environmental sensitivity as Canada. In this regard, it is significant that not all nations consider environmental problems to be matters of utmost priority, for it is primarily the highly industrialized, and consequently polluted, nations which will have this concern. Secondly, even if claims up to 200 miles were valid, unilateral controls would leave large parts of the ocean unregulated. This is particularly important since pollution of the oceans is not confined within national, coastal state boundaries; but, because of ocean currents, it transcends political boundaries of coastal states. Further, oceanographers and U.N. reports note that marine pollution is not confined to particular oceanic areas, but it is a problem of global dimensions. Hence, coastal state controls, even if extended to 200 miles, are inherently limited geographically, and they do not provide an ultimate, nor even an effective, solution to control of marine pollution. Thirdly, there are presently no international minimum pollution control standards like those existing in U.S. laws regarding federal-state regulations of air and water pollution. Since many of the world's 132 nations border on the ocean, a principle favoring coastal state regulation of the high seas to or beyond 100 miles would result in many different environmental regulations by those nations. Some states might have very high standards, like Canada, or other states might have weak, inefficient controls. With the absence of uniform, or at least minimum international standards, the different coastal state controls would result in a checkerboard approach to marine environmental standards. Finally, some states might not enact environmental controls; and some states may encourage pollution to attract foreign investors due to reduced operating costs in not installing pollution abatement equipment. Thus, 'environmental havens' might exist in various parts of the world much in the same way that certain havens from tax and labor laws have been created by certain countries for multinational corporations or for shipping companies. This "flags of convenience" approach has proved disastrous in terms of controlling oil pollution from ships.

On the other hand, the Canadian approach may be necessary: (1) in exceptional cases where the marine environment contains ecosystems which are vulnerable, (2) as an interim measure during the present formulation of international law standards on pollution, (3) where other means of control, through bilateral or regional arrangements, cannot be taken. In short, the Sierra Club for the reasons stated above should not support unilateral coastal state extension of jurisdiction over the high seas for pollution control except in the limited, exceptional circumstances set forth in the preceding sentence.

Presently international efforts are being made on a bilateral or regional basis, to control marine pollution. The United States and Canada recently concluded water quality agreements for the Great Lakes, and the United States and U.S.S.R. have concluded agreements for environmental cooperation including matters involving oceanic pollution. On a regional basis, European nations concluded the Oslo Convention on Dumping, and more recently another Ocean Dumping Convention was opened for signature. There are other developments which suggest future regional arrangements in the Mediterranean and other enclosed seas. In sum, these international efforts, which in general represent a more comprehensive approach to oceanic pollution control, should be favored over unilateral assertions of jurisdiction on the high seas.

2. *The Territorial Sea, the Contiguous Zone and the Emerging "Patrimonial Sea" or "Economic Resource Zone"*

With the majority of states adopting a 12-mile territorial sea, the contiguous zone under the 1958 Geneva convention has little relevance because it has an outer limit beyond the territorial sea (originally 3 or possibly 6 miles) of 12 miles. However, the concept of the contiguous zone is not defunct, but it is being reformulated under the newer notion of a "patrimonial sea" or a coastal state "economic resource zone."

In preparation for the law of the sea conference, many states have urged that the coastal state be given certain rights on the high seas, up to 200 miles, for development of mineral and living resources. This constitutes a further develop-

ment of the 200-mile claims by Latin American countries. These countries advocate that the coastal state be given primary or exclusive jurisdiction to regulate resource development on the high seas up to 200 miles. This jurisdiction would include the right to control pollution, and some proposals submitted to the U.N. suggest that the coastal state have exclusive jurisdiction over environmental matters in the patrimonial sea.

It would appear unnecessary, and undesirable, for the Sierra Club to take a particular position on whether the territorial sea, contiguous zone, or patrimonial sea should be limited to a breadth of 12, 100 or 200 miles. The demarcation of such limits is a political issue which is highly controversial. From an environmental position, such boundaries are necessarily based upon arbitrary factors rather than upon scientific, ecological data which recognize the fundamentality of all oceanic life. Finally, acrimonious debates exist between the United States and Latin American countries over the 200-mile limit, and the Sierra Club should avoid the breadth issue in order to influence the formulation of important environmental issues.

If the "patrimonial sea" is made a part of international law, then it would be desirable from an environmental view that the coastal state be given certain, perhaps primary, but not exclusive jurisdiction in that area up to 200 miles from shore. The waters above the continental shelf to 200 miles are the richest in resources, both living and mineral. The continental shelf waters are biologically the richest marine areas, while the open sea is comparatively a biological desert devoid of much marine life. In these fertile "pastures" of the sea, plankton produces abundantly due to favorable factors including upwelling of bottom nutrients, light, and temperature. This "primary" production occurs in the very shallow euphotic zone consisting of 2 to 3% of the upper waters, and, as the base of the food chain, it powers 90% of all oceanic life. The continental shelf also contains the greatest concentration of mineral resources, such as oil and gas, and unfortunately, the waters over the continental shelf are also the most polluted. As man's dependence upon marine mineral resources increases, the dangers of marine pollution will rise significantly. Thus, if the concept of the "patrimonial sea" is embodied in international law at the U.N. conference, the coastal state should not be given exclusive pollution control jurisdiction in this area because of its wealth of biological and mineral riches and because the abundant biological resources vitally affect the entire web of marine life throughout the oceans.

If the "patrimonial sea" develops, the coastal state should be required to act as a custodian, for all nations, of its marine environment. Although some countries are heavily dependent upon ocean resources for economic reasons and as food source, resource development in the patrimonial sea may affect the interests of other states. The adequate protection of marine environment may be important to the countries advocating this concept, or a 200-mile limit, for several reasons. A clean environment is important to any country dependent on the ocean as a source of food. Further, many developing countries are situated in tropical zones of the ocean which contain delicate ecologies that can be as easily disrupted as arctic waters. Environmental controls will also be important to countries other than the coastal states. Pollution from offshore oil wells may not only injure the state permitting such drilling, but it may impair the quality of ocean waters of riparian or other coastal states. In brief, in view of the highly inter-related nature of the marine environment, if the coastal state is given jurisdiction over a "patrimonial sea," it should be required to act as a custodian of the marine environment to assure the ocean's ecological integrity for all nations.

Finally, the coastal state's jurisdiction of pollution in that area should be subject to international standards. If the coastal state did not enact minimum environmental standards, then an international body should have authority to promulgate and enforce them. This interplay of coastal state and international environmental jurisdiction would be similar to the regulation of water pollution in the United States by the federal and state governments. Thus, the coastal state would have primary—but not exclusive—jurisdiction for environmental controls in the patrimonial sea: but if it failed to enact or enforce minimum international environmental standards, then an international authority would have the jurisdiction to prescribe such measures.

3. Obligations Under International Law to Prevent Pollution and Preserve the Marine Environment

The principal prohibitions of polluting the oceans are contained in Articles 24 and 25 of the 1958 Geneva Convention on the High Seas. The prohibitions of the High Seas and other Geneva conventions have proved wholly inadequate to

regulate or prevent marine pollution. The High Seas Convention is primarily concerned about two classes of pollutions, oil and radioactive substances, rather than all sources of pollution. The conventions contain broad language, which, at the coming conference, should be replaced with more specific criteria. Further, the 1958 Geneva conventions contain a more fundamental defect, for they are based in a fragmented, piecemeal approach to the causes and remedies of marine pollution. Future provisions in law of the sea conventions should be based upon a comprehensive, systematic approach to marine pollution and oceanic life, which is suggested by scientific ecological analysis.

There is a threshold question of what constitutes pollution, a term which is not defined in existing law. The U.N. has suggested the following definition:

"The introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazard to human health, hindrance to marine activities, including fishing, impairment of quality for use of sea water and reduction of amenities."

A comprehensive approach has been suggested by the U.N. Intergovernmental Working Group on Marine Pollution (IWGMP), which adopted principles that were endorsed by the Stockholm Conference on the Human Environment in its Recommendation for Action No. 92. That Stockholm Recommendation stated that the IWGMP principle should be "guiding concept" for the U.N. Conference on the Law of the Sea. In its Declaration of Principles, the Stockholm Conference further stated the obligation of states to protect the oceans:

"Principle 7: States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea."

A comprehensive approach to marine pollution is also supported by Canada, and defined by it as "a concerted attack on all sources of marine pollution whether land based or marine based." This is necessary because it is "evident" that "existing international conventions, even taken together, do not constitute a comprehensive approach to the preservation of the marine environment." Canada urges that the conference on the Law of the Sea adopt the keystone for such a system by elaborating a "matter or umbrella treaty."

Finally IWGMP, whose principles are attached, urges that the implementation of controls should be "flexible" to reflect increasing knowledge of the marine ecosystems, and the discovery of new or unsuspected pollutants.

Thus international law should be revised to define pollution and to clearly state a general obligation of all nations to protect and preserve the ecology of the oceans and these provisions should manifest a comprehensive, systematic approach to the control of marine pollution.

4. International Regimes For the Seabed and Deep Oceans

One of the principal reasons for the Law of the Sea Conference is that international law contains no clear rules governing the ownership of ocean mineral resources beyond the vague legal limits of the continental shelf. These resources, especially hard minerals like manganese nodules, are estimated to represent immense potential wealth; and they could supply a large part of the world's needs for basic metals as land based sources are exhausted. Until recent technological advancements, these minerals were inaccessible. Consequently, rules were formulated concerning ownership and development.

U.N. resolutions and the seabed proposals of many countries declare that these resources belong to all nations. They are "the common heritage of all mankind," which are not subject to appropriation by any State. Many countries urge the creation of an international agency to regulate the development of these resources. The United States, through Presidents Johnson and Nixon, has approved these principles. In addition, on August 30, 1970, the United States submitted a draft convention which would establish an International Seabed Resource Authority with jurisdiction over certain areas of the ocean to govern seabed mineral resource development.

Under the U.S. proposed seabed convention, the "international seabed area" would comprise all of the seabed and ocean floor seaward of the 200 meter isobath (approximately 50 miles from shore). This area would be the "common heritage of all mankind," which could not be subject to national appropriation or sovereignty by any one nation. Jurisdiction of the international seabed area would be divided between the coastal state and an international agency. In the zone of the ocean seaward of the 200 meter isobath to the edge of the continental

margin (the point where the continental shelf tapers off to touch the bottom or abyssal floor), the coastal state would have primary jurisdiction, acting as a trustee for the benefit of all nations. As a trustee, the coastal state would not own the resources, and it would be required to give a portion of its revenues (50-66%) to the international authority. In the trusteeship zone, the coastal state would issue licenses to corporations for mineral exploration or exploitation, and its licensing, regulatory authority would include jurisdiction over environmental matters.

The "international seabed area" beyond the continental margin would be governed by a newly created international organization—the International Seabed Resource Authority (ISRA). It would have power to regulate mineral development in that area. Further, if the trustee failed to take environmental measures in accordance with the convention, the ISRA may request compliance, and, on refusal, commence legal proceedings before the ISRA's Tribunal.

The institutional structure of the ISRA suggests a very large international agency, patterned in some respects after the structure of the United Nations. The ISRA will have three principal organs: an Assembly, Council, and Tribunal. The Assembly will consist of one representative from each state which is a party to the treaty, who will have one vote. The Council will be composed of 24 nations, balanced between the "six most industrialized" and 18 other contracting states, "at least 12 of which shall be developing countries." The Assembly will exercise legislative powers to approve budgets for the ISRA, take action on matters referred by the Council, and consider any matter within the convention and make recommendations to the Council and member states. The Council will appoint various Commissions, an administrative chief, the Secretary-General, issue "emergency orders" to prevent "serious harm to the marine environment" from seabed exploration or exploitation activities, and coordinate the ISRA's environmental activities with the U.N. and other international organizations "concerned with the marine environment."

The administrative tasks will be accomplished by a staff consisting of three commissions: A Seabed Boundary Review Commission, the Rules and Recommended Practices Commission, and an Operations Commission. None of these committees, as to the competence of appointed members, are required to appoint persons with expertise in oceanography, marine biology, or ecological matters. Finally, the ISRA will have a Tribunal to decide all disputes and advise on all questions concerning the interpretation and application of the convention.

The exploitation of seabed minerals presents serious potential environmental problems. Although development of seabed minerals other than oil has not commenced, there is reason for concern about the impact of such development of the marine environment. In general, pollution from seabed mineral exploitation will increase the existing levels of oceanic pollution. Oceanographers and U.N. reports warn that without such development marine pollution seriously threatens the continued viability of life within the oceans. Marine mineral development, and any regime regulating it, must be analyzed in view of the fact that the oceans' environmental quality is presently severely deteriorating.

Commercial dredging operations have not begun, but past experiences in coastal waters suggest possible substantial environmental disruptions. A cautious environmental approach to deep-sea mining and dredging is warranted in view of the devastating effect of dredging on aquatic life in the Gulf of Mexico which destroyed 20% of shellfish producing waters. Recent U.N. reports warn of a number of harmful effects of seabed mineral exploitation. At the dredging site, benthic or bottom dwelling communities may be destroyed. Turbid waters and siltation from dredging could injure downstream communities or interfere with plankton production on or near the ocean surface. Finally, recent studies by U.S. oceanographic centers warn that while many parts of the ocean may be biologically barren, a cautious approach is justified due to man's incomplete knowledge of the oceans and marine life.

The U.S. draft convention, and the seabed proposals of other nations submitted to the U.N., should contain adequate provisions to protect and preserve the marine environment from further degradation. However, they do not contain such provisions. The proposed seabed conventions also raise, without resolving, a conflict of interest inherent in creating an international institution to both promote mineral development and protect the marine environment.

The ISRA's jurisdiction of pollution only extends to pollution "arising from exploration and exploitation activities, such as drilling, dredging, excavation of waste, construction and operation of installations and pipelines and other devices." (Article 23) However even as to this limited environmental jurisdic-

tion, the U.S. draft seabed convention contains vague, general provisions concerning pollution arising from seabed development. Exploitation must not "unjustifiably" interfere with other activities in the ocean, and "adequate" measures must be taken to protect the "safety" of the marine environment. Although the Council may issue ecological "emergency orders," no consideration is given to preventing such occurrences through an advance review of projects to scrutinize any significant environmental effects.

In contrast to the lack of well conceived and articulately drafted environmental provisions, the convention contains detailed rules in an annex on the procedures for licenses, including initial fees, working requirements, submission of work plans. Because of such provisions, some critics have described the U.S. draft seabed treaty as a "benignly written mining code."

There is no requirement of an environmental impact analysis by a proposed licensee of the ISRA or a trustee coastal state. This requirement would not present problems, for the companies with the technological sophistication to develop seabed mineral resources are from western industrialized nations. They have the ability to perform environmental analysis, like NEPA impact statements. U.S. companies are already familiar with these procedures. This type of environmental analysis performed by corporations of western nations would not impose a burden on developing nations. More importantly, the trend in other international organizations is to build environmental impact analysis into the process of policy planning and review. The World Bank has such procedures and the United Nations after the Stockholm Conference, will implement that type of development planning. Since under Annex Articles 7 and 8 a license applicant must submit his "plans" of the proposed work, equipment, and "methods," an environmental scrutiny should be made by the ISRA prior to issuing the license.

The convention contains provisions for liability in the event of environmental damage. However, allocation of liabilities is primarily remedial. Rules of liability are no substitute for the protection afforded by environmental analysis prior to issuing a seabed license.

In brief, at the very least, an environmental impact analysis should be incorporated into the U.S. proposed seabed convention, or any other seabed regime approved by the Conference on the Law of the Sea, to protect the marine environment.

Even if the U.S. seabed proposal were modified to strengthen ecological language and require environmental impact analysis, a further problem remains. This is the conflict of interest inherent in an agency which promotes resource development and purports to protect environmental values. In the United States, this conflict resulted in the creation of the Environmental Protection Agency. Some federal agencies, such as the Atomic Energy Commission, had a built in conflict of interest in both promoting and regulating atomic energy. However, while the A.E.C. was forced to comply with NEPA in the *Calvert Cliffs* decision, there is no NEPA in international law. Nor is there an international Environmental Protection Agency, although the U.N. Environment Secretariat may perform some functions like the EPA but without its ability to commence legal proceedings against polluters. In view of the limitations of international law regarding the environment, it is essential that in depth analysis be performed now, before positions crystalize for the law of the sea conference. Further, the U.S. seabed regime should be redrafted to avert or mitigate this potential conflict of interest.

Of all the nations proposing seabed regimes, only Canada has recognized this serious conflict:

"[T]he international seabed regime and machinery may eventually be subject to the same conflict as between conservation interests on the one hand, and economic interests on the other, that has already marked debates on national resource development policies on the national level . . ."

According to the Canadian proposal, this conflict can only be averted through the "elaboration and acceptance of stringent safety standards from the very outset." If international law does not create a regime soon, companies may decide to proceed before the law catches up with accelerating technology. This would result in a "free-for-all among the giant corporations of the major industrialized powers, with the inherent danger that resources will be wasted [and] the environment suffer degradation . . ." Canada suggests a transitional regulatory system to avert such environmental chaos.

According to Canada, the conflict of interest in an international seabed agency can be cured only through providing stringent environmental standards at the out-

set. Certainly, these standards are much easier to establish at that time. In this regard, the oceans present an unusual opportunity to soundly manage resources and prevent environmental catastrophes before commercial development begins and interests vest in low cost, polluting operations.

The basic thrust and structure of the U.S. proposed ISRA could be altered to avert the conflict. The ISRA could be empowered to collect and monitor global information on marine pollution, living and nonliving ocean resources, and other oceanographic data in order to form comprehensive plans for both the conservation and development of ocean resources. A greater emphasis on rational resource management should be made in the draft convention rather than on creating an international ocean mining agency. The scope of the ISRA should be broadened beyond its narrow ken of deep-sea mineral resource extraction. There are many analogies in domestic U.S. law, for an enlarged ISRA balancing development and conservation of resources, such as the San Francisco Bay Conservation & Development Commission, the California Coastal Commission, and others.

Unless the seabed regime is revised to eliminate the existing conflict of interest, the international seabed agency may reflect only the commercial interests purportedly regulated. It may become as institutionally insensitive to marine environmental problems as the present International Whaling Commission. In addition to expanding its purposes, the ISRA's commissions' membership must be revised to require a fair representation of the environmental viewpoint including marine biologists, oceanographers, and other persons with expertise in marine pollution or ocean ecological problems.

Some provision should also be made to allow international organizations, n.g.os, and entities other than sovereign states, to bring proceedings in the ISRA Tribunal to review the environmental programs, policies, and impact analysis of the ISRA, its commissions, and the trustee state. There is little assurance without such enforcement that other states would act to challenge proposed licenses that present significant environmental problems. The licensing authority, ISRA, cannot police itself. Consequently, other international environmental organizations should be granted standing before the ISRA to review its decisions which may have a significant impact on the environmental quality of the oceans. While citizens suits in domestic law are sometimes resisted because of the millions of potential plaintiffs, these dangers certainly do not exist for the limited number of international environmental organizations.

Finally, several procedures exist for reviewing the seabed regimes before they are discussed at the U.N. Law of the Sea Conference. First, the United States is required to file a NEPA statement on international conventions. Unlike the recent Ocean Dumping Convention, the NEPA statement of President Nixon's Draft Convention on the International Seabed Area of August 30, 1970 should be prepared now, before the Conference, when bargaining positions are formed which allegedly prejudice a thorough NEPA impact analysis of all possible alternatives. Secondly, the Sierra Club, through the New York office, should request that the United Nations perform an environmental study of all seabed proposals. The U.N. has already performed many "economic" studies of various kinds of licensing regimes, but there has been no comparable analysis of the impact of these proposals on the environmental quality of the oceans. After the Stockholm Conference, the U.N. should, in addition to creating general awareness of the global environment, analyze its own activities, proposals, and conferences which may affect the environment. The new Secretariat for Environmental Affairs could carry out this U.N. environmental study of the proposed seabed regimes.

In sum, the proposed U.S. convention on the international seabed area presents many substantial environmental problems that have not been sufficiently analyzed, let alone resolved, by the United States or other nations. The convention contains vague, weak provisions concerning pollution from seabed activities. There is no requirement that the ISRA, its commissions, and trustee states thoroughly analyze a seabed project before issuing an exploration or exploitation license; and there is no method for other international organizations to obtain judicial review before the ISRA Tribunal of the adequacy of such an analysis. Even if the convention were revised to incorporate stringent ecological standards and a required environmental impact analysis, a fundamental defect persists. The ISRA has a built in conflict of interest in protecting the oceans' environmental quality when its objective is to license mineral development and generate large revenues for all nations. This conflict can be averted by changing the ISRA's structure, enlarging its objectives to rationally study, plan and man-

age ocean resources, and balance both conservation and development interests. In addition, the ISRA should be required to appoint and hire persons with the highest competence in marine environmental matters. These criticisms apply not only to the U.S. draft seabed convention, but to similar inadequacies in the proposals of other nations.

All of these problems can and must be confronted and resolved without further delay before the U.N. Conference on the Law of the Sea. Unlike conventions on endangered species, ocean dumping, and Antarctic seals, there are no existing environmental problems from seabed mineral development because it has not actually commenced, and it may not become commercially profitable for several years. Commercial interests, then, have not vested. In contrast to man's usual lack of foresight which results in unnecessary environmental disasters, the oceans present a rare opportunity for global cooperation by all nations to avert further marine pollution by a careful, prior scrutiny of the environmental consequences of seabed resource extraction. Unless this challenge is met, the oceans become man's last industrial wasteland, resulting in the death of oceanic life, thereby endangering the survival of terrestrial species, including man.

These problems should be immediately discussed and reviewed by the new U.N. Secretary on the Environment, and by a thorough NEPA analysis within the United States.

5. Other Law of the Sea Issues

Other law of the sea issues may affect the oceans' environmental quality, including "flags of convenience," enforcement of convention provisions on pollution, and international marine preserves.

(a) "Flags of Convenience": Under present international law, a ship has the nationality of the flag it flies. This is true even though the owners are citizens of a nation other than the flag state or state of registry. The state of the ship's registry has the exclusive jurisdiction to regulate the ship's conduct. Consequently many states, the so-called "flags of convenience," are chosen because of weak or non-existing shipping laws. The principal "flags of convenience" states are Panama, Liberia and Honduras, known as the "Panlibbon" group. The "flags of convenience" is thus a law avoidance device.

Its principal use is to circumvent U.S. labor laws. However, the fact that the state of registry has exclusive jurisdiction over the ship's offenses also has environmental consequences. Under the 1954 London Oil Pollution Convention, only the state of registry may punish a vessel making prohibited discharges of oil unless the oil should damages a state's territory or territorial sea. Obviously the flag state has little interest in prosecuting any offenses. By comparison, it would be an anomaly in domestic law if polluters were prosecutors of their own violations of pollution control laws. One writer has warned that:

"Indeed world-wide acquiescence in flags of convenience could greatly stultify, if not render completely ineffective, an international regime for controlling pollution from tankers, pipelines, deep-sea mining and high seas mineral extraction from seawater. All that is needed for the avoidance of the regime is that some state (no matter how small) should remain outside the regime, freely register ships and mining corporations under its domestic laws and irrespective of the nationality of their management and the sources of their capital, and rely on its rights (and hence those of the ships and enterprises it registers) under customary international law to treat the high seas as a common (and thereby 'capture' hydrocarbons, hard minerals and chemicals in suspension in sea water through *occupatio res nullius* as fish are captured today, dump tailings and refuse, lay pipelines, and generally treat the high seas as an infinite sink)."

Thus the flags of convenience principle in international law should be abandoned at the law of the sea conference and a ship should have the nationality of the state with which it has the closest nexus or most effective connection. If this principle cannot be entirely abandoned, then a significant exception to the rule must be created for pollution and environmental matters. The two 1969 Brussels Conventions allowing a coastal state to proceed against a tanker on the high sea which threatens an oil catastrophe indicates a departure from the flags of convenience approach, which should be further expended at the law of the sea conference.

(b) Enforcement—The Universality Principle: There is a need for effective enforcement measures to redress violations of marine pollution articles in law of

the sea conventions. One method would be the application of the universality principle in international law to pollution. Under international law, certain widely condemned crimes, as slavery, slave trade, or genocide, are matters of universal jurisdiction. Any state may arrest and punish a perpetrator of those crimes regardless of the nationality of the offender or victim or the place of the crime.

The universality principle, if extended to pollution, would permit the apprehension and punishment of a polluter of the oceans irrespective of where the pollution occurred or whether it directly injured the arresting state. This principle should be extended to marine pollution in view of its threat to the life in the oceans and to human survival. It would prevent polluters from sheltering marine polluting activities in states which have weak or nonexistent laws. Enforcement should not be limited merely to other states; but it should be permitted by international agencies and nongovernmental organizations in the U.N. which have interests in environmental affairs. Finally the list of pollutants covered subject to universal arrest and punishment need not extend to every contaminant of the ocean, but only to those serious pollutants established by marine scientists, such as GESAMP.

(c) International Marine Parks and Preserves: In the United States and many other countries, valuable wildlife areas are permanently set aside. Under the recent Marine Protection Research, and Sanctuaries Act of 1972, this also applies to offshore areas, for marine preserves can be declared in continental shelf waters. The concept of protecting ocean areas with valuable marine ecosystems should be extended beyond the limits of coastal state jurisdiction. A "world heritage trust fund" has been proposed to grant special status to land based wildlife areas of international significance. Similarly, valuable oceanic regions, with unique marine life, species or ecosystems, or areas of aesthetic, educational, scientific, or ecological value should be protected through an international marine sanctuary convention. This has been suggested in the U.S. draft seabed convention, but the creation of a marine preserve in the trusteeship zone would require the consent of the trustee coastal state.

Such a convention could give special protection to the oceanic areas where primary production occurs. The areas of abundant primary production have been identified by oceanographers. They are critical to all life within the oceans since plankton forms the base of the food chain; and it is important to terrestrial life, including man, because of plankton's function as the principal regeneration of the earth's oxygen through photosynthesis. International protection of ocean areas rich in plankton has recently been advocated by Jacques Costeau.

One especially desirable area for an international marine preserve is the Southern Ocean surrounding Antarctica. After a decade of oceanographic research, there is little doubt that the Southern Ocean is "the world's most fertile large oceanic region." It is a most appropriate place for an international marine sanctuary protection because, as a polar region, it is not subject to claims of ownership by sovereign states. While the Humboldt Current off Peru is also richly endowed with marine life, Peru claims rights up to 200 miles over it, and consequently an international marine conservation convention for the Humboldt Current might be difficult to conclude. However, these problems do not exist in Antarctica or the Southern Ocean. There have been significant international conservation efforts in Antarctica under the Antarctica Treaty of 1959. For example, the treaty area of Antarctica was declared a "Special Conservation Zone," and the introduction of foreign flora and fauna, or killing indigenous animals are forbidden without special permits. Further, penguin and seal rookeries have been given special protection. The recent Antarctic Seal Convention further demonstrates the environmental cooperation in Antarctica. This cooperation can and should be extended beyond the Antarctic continent to the rich sea encircling it.

Thus, in addition to presenting its views on traditional law of the sea topics, the Sierra Club can make a new and positive contribution by suggesting an international treaty for the conservation of valuable ocean areas. Since this concept has not yet apparently been proposed, the Sierra Club can urge the consideration of such an international marine convention for the law of the sea conference. In cooperation with oceanographers, it could draft a model marine convention for ecologically significant oceanic areas of primary production, or a special convention for Antarctica's Southern Ocean.

CENTER FOR SCIENCE IN THE PUBLIC INTEREST,
Washington, D.C., July 9, 1973.

HON. WARREN G. MAGNUSON,
*Chairman, U.S. Senate Commerce Committee, 5202 New Senate Office Building,
 Washington, D.C.*

DEAR SENATOR MAGNUSON: Since the oceans, which represent 70% of the earth's surface, are this planet's last frontier, we think it imperative that steps be taken to protect them from further pollution, particularly from oil spills.

Bills S. 1067 and S. 1070, which we have reviewed, are steps in the right direction toward alleviating the problems caused by large oil spills in the oceans. We suggest that to S. 1070 be added the intention of Congress that eventual enforcement of oil pollution regulations on the high seas be a United Nations or other international organization function. Ocean transport and discharge of oil can effect the environmental quality of the ocean even when the traffic does not enter U.S. waters. The U.S., however, should not have to become the ocean's policeman. That should be the task for an international group such as the U.N. The upcoming IMCO conference will focus on this issue.

Specifically, we have the following comments on the two bills:

S. 1067

Restriction of international discharge is quite important. Expressing the exceptions to the discharge ban in quantitative language, as proposed in Section 2, will ease enforcement of the provision and limit confusion as to its applicability.

The establishment of tanker construction standards (Section 5) is a very important development. The certification procedure, as proposed, is a solid initial step in oil pollution control. Certification should evolve to include discharge methods used by each vessel. We are pleased that S. 1067 would authorize the Secretary to refuse entry to tankers from countries not subscribing to the International Convention for Oil Pollution Prevention.

Present law classifies a discharge violation as a misdemeanor. Section 7 proposes stiffer penalties. We find these measures still inadequate. It is our contention that a \$10,000 fine is insufficient to deter oil interests from illegal oil discharging. These organizations are large, sophisticated operations and the proposed penalties are relatively minimal for them. For the public, the costs of oil pollution are high. We feel they should be so for the violators.

Section 9 proposes an increase in categories to require record book entries. Especially important are the inclusion of tanker loading and unloading operations. We believe the improved recording procedures will encourage better discharge practices.

S. 1070

As previously noted, spills outside U.S. waters can have consequences equal to domestic spills. As a temporary measure, the intervention authorized by this act is useful, but the intent should not be to establish a unilateral policing force.

We support the intent of S. 1067 and S. 1070. These measures will contribute to efforts aimed at alleviating oil spill damages. But regulation can not stop at this level; oil pollution is a serious threat to the ocean environment and should receive serious consideration and prohibition. As long as tanker operators are permitted to place personal convenience and economy over the environmental quality of areas belonging to all, oil discharges will continue to create large scale damage.

Sincerely,

JAMES SULLIVAN.
 ALBERT FRITSCH.
 MARK MAZAK.

CENTER FOR LAW AND SOCIAL POLICY,
Washington, D.C., June 29, 1973.

International Convention for the Prevention of Pollution From Ships, 1973.

Capt. S. M. SHUMAN,
*Executive Secretary, U.S. National Committee for the Prevention of Marine
 Pollution, U.S. Coast Guard, Washington, D.C.*

DEAR CAPTAIN SHUMAN: In accordance with the request of the United States National Committee for the Prevention of Marine Pollution, we are submitting

herein, on behalf of five national, environmental organizations—the Environmental Defense Fund, Natural Resources Defense Council, the National Parks and Conservation Association, Friends of the Earth and the Sierra Club—our comments on the Final Draft text of the proposed International Convention for the Prevention of Pollution from Ships, 1973 (the “Convention” or the “Fifth Draft”). A number of these same comments were expressed in our letter to you, dated January 26, 1973 (the “Fourth Draft Comments”), regarding the Fourth Draft of the Convention, and are included here again for ease of reference. We urge the Committee, nonetheless, to read the comments submitted below together with the Fourth Draft Comments in order to have the benefit of the full scope of our views.

From the viewpoint of our clients, ship-generated oil pollution is clearly the most important environmental problem treated in the Convention. More than 45% of the annual 5 million tons of oil injected into the oceans from all sources can be attributed to ship operations, including operations of tankers, tank barges and non-oil carrying vessels. If, as is expected, waterborne imports of petroleum products to the world's industrial nations grow, the amounts of oil pollution will tend to grow proportionately unless positive international action is taken now. The threats of oil pollution, of course, are not just those associated with massive spills engendered by tanker accidents such as that of the *Torrey Canyon*, but also result simply from the normal ballasting, deballasting and tank cleaning operations of oil tankers, which account for approximately 70% of tanker-generated pollution.

The Convention has the potential for substantially reducing the risks of pollution by oil and other harmful substances. In theory, its purpose, as expressed in the Preamble, and as expressed in Resolution A. 237 (VII) adopted by the IMCO Assembly on October 12, 1971, is to achieve “the complete elimination of intentional pollution by oil and other harmful substances and the minimization of accidental discharge of such substances,” by 1975, if possible, but definitely by 1980. However, if it is to achieve this goal it must provide for stringent and broadly applicable international standards. Most importantly, we believe that, if the Convention is to be acceptable to the environmental community, it must establish discharge criteria for polluting substances, reinforced by strict design and construction standards, which will work a real and substantial improvement in the marine environment. As presently proposed, however, the Convention appears to do little more than codify existing commercial standards among the major maritime nations, provides no incentive to improve such standards, and offers insufficient environmental protection.

With respect to ship-generated oil pollution, there is no question that the means are available to eliminate the intentional discharge problem. Unfortunately, they are not reflected adequately in the Fifth Draft of the Convention. We believe that, from an environmental standpoint, imposition of a uniform, no-discharge standard for all types of oil, accomplished through the requirement of incorporation of a segregated ballast/double bottom system, is a fundamental requirement for an effective Convention.

In addition to the fundamental need for adequate discharge and design standards, there are two other basic areas of concern which we have about the final Convention. If the Convention fails to establish adequate enforcement mechanisms or to provide for broad application of its provisions, its ultimate impact on reducing pollution of the oceans will be severely limited. Thus, the Convention must (1) provide for mandatory enforcement of the discharge and design and construction standards which it establishes and (2) provide for comprehensive regulation of ship-generated pollution, applying to the widest possible number of states, kinds of vessels and variations of situations.

Finally, there are a number of specific provisions in the Convention or its Annexes which we support or oppose or with respect to which we have suggestions for improvement, requests for clarification or questions as to meaning. These detailed points are set forth below after a discussion of the more general issues raised by the Convention.¹

¹ We note at the outset that, although tanker casualties result in approximately 18% of tanker-generated oil discharges, neither the Convention nor other international agreements presently in force mandate the incorporation of collision avoidance and maneuverability features which might aid in reducing accidental pollution caused by such incidents. Design innovations such as controllable pitch propellers, bow and/or stern thrusters and twin screws/twin rudders can substantially increase maneuverability, thereby decreasing the risk of accident, especially in narrow, crowded and shallow ship channels, while automatic collision avoidance radar plotting systems may further reduce such risks. We therefore believe that the United States should take the lead in stimulating development of international agreement in this area as soon as possible.

1. GENERAL COMMENTS

(a) The Convention must improve uniform, meaningful discharge limitations and stringent design and construction standards.

The fundamental requirement of an effective Convention is the establishment of meaningful, uniform discharge criteria and stringent design and construction standards to guarantee that these criteria are met. Discharge limitations and design standards are intimately related. A discharge limitation may be little more than a pious platitude unless it is reinforced by technologically sound hardware. Reliance on procedures, such as the load-on-top procedure, for example, which depends upon such factors as crew skill and diligence, weather conditions, product type and voyage length, is simply no substitute in most cases for a structural solution, such as that obtained by segregated ballast capacity, to the discharge problem. For the same reasons, it is imperative that the choice of means to achieve discharge limitations not be left open to the Contracting States but be mandated by the Convention itself. With regard to oil pollution in particular—the most significant element of ocean pollution and the major focus of the Convention—it is essential to impose (1) a uniform discharge limitation for all types of oil, (2) a no-discharge limitation, and (3) a structural solution to the discharge problem, i.e., imposition of a segregated ballast/double bottom requirement.

(i) *One Discharge Standard for Oil.*—The Convention as now drafted provides for a single discharge standard for “oil or oily mixtures”, which are broadly defined in Regulation 1, para. 1, of Annex I, to include “petroleum in any form”. However, there is substantial pressure, as suggested by Footnote 1(ii) to Annex I, to establish a dual standard, with “persistent” or black oils presumably being subject to more stringent controls than “non-persistent” or white oils. This proposal is environmentally unacceptable. Although white oils may evaporate faster than black oils (but *not* in turbulent waters), and although their discharge may not always have the same visible effects as the discharge of black oils, i.e., fouling of fishing nets, deposits on beaches, coating of birds and wildlife, etc., the effects of white oil discharges may be subtler and ultimately more harmful for the environment, since these oils, which contain a higher percentage of aromatic and aromatic derivative compounds than crude oils, will have greater toxic effects on marine biota.

The higher toxicity of white as opposed to black cargoes has recently been documented in the final environmental impact statement, released on May 30, 1973, by the federal Maritime Administration regarding its tanker construction program at pp. IV-42 through IV-51, and IV-103 through IV-104. This impact statement reveals that aromatic fractions, many of which are water soluble, are often quite toxic to marine organisms at extremely low levels of concentration, i.e., toxic effects on larvae may occur with concentrations as low as 0.1 ppm. Moreover, concentrations of these hydrocarbons in a range of 10 to 100 ppm may cause behavioral pattern changes, while incorporation of such hydrocarbons in tissues of marine organisms, and thus into the food web, has potential public health implications for humans. In general, as is stated by the comment of Professor Stephen Moore of the Massachusetts Institute of Technology at pp. G-216, 217 of this impact statement, “substances containing higher concentrations of these lower boiling aromatics are likely to cause greater biological damage, e.g., refined products such as no. 2 fuel oil, can be expected to have a much greater impact than most crude oils, other things being equal.”

The dangers associated with discharges of white oils are underscored by two further factors. First, white oils are ordinarily primarily carried in coastwise trades near sensitive bays, estuaries and coastal breeding grounds. Thus, merely as a result of trade routes, their discharge will tend to produce serious deleterious effects. Second, because they are more water soluble, discharges of ballast water and from oil water separators will contain significant concentrations of potentially toxic materials.² In sum, given the current state of knowledge about the effects of oil pollution on the marine environment, establishment of a dual discharge standard would be wholly unwarranted.

(ii) *Meaningful Discharge Criteria.*—Any discharge limitations established under the Convention must be the best attainable with existing technology. In Annex I, the critical limitations are contained in Regulation, para. 16, which

² This latter point is of particular significance with regard to the effectiveness of load-on-top equipment (see discussion *infra*, at 8), and it underscores the ineffectiveness of this alternative for pollution prevention as compared to a segregated ballast system.

provides that evidence, based upon an oil content monitoring arrangement, that oil content of effluent does not exceed "[15]" ppm is conclusive of the question that ballast is "clean", while Regulation 9 to Annex I establishes elaborate discharge limitations based upon instantaneous rates of discharge per nautical mile (Regulation 9(1)(a)(iv)) and total quantity discharged as a percentage of cargo (Regulation 9(1)(a)(v)).

The environmental basis for these limitations, as well as for the "visible trace" clean ballast standard in Regulation 1(16), is far from clear and, as proposed, they are unacceptable. Indeed, they do little more than codify existing outflow standards which are already met through utilization of load-on-top procedures (currently employed on 75% of existing tonnage). For example, if the Convention were to permit the discharge of 1/30,000th of the cargo of a 300,000 dead weight ton "supertanker" (as is now proposed), this would mean that almost 10 tons of oil could be discharged per voyage, and, assuming 40% ballast, the effluent could contain 100 ppm of oil. As noted above, severe environmental damage can result from very low concentrations of aromatic derivative compounds in sea water. Moreover, permitting any discharge at all adds to the increasing accumulations of oil in the oceans. It has recently been reported by the National Oceanic and Atmospheric Administration that "oil globules . . . in massive proportions infect nearly 700,000 square miles of blue water from Cape Cod to the Caribbean Sea." *Mar Map Red Flag Report (No. 1), Fish Larvae Found in Environment Contaminated with Oil and Plastic* (January 18, 1973). If seaborne imports of oil to the United States and Western Europe increase, and if oil tanker numbers and traffic increase, as both government and industry project, the environmental degradation from oil pollution resulting from vessels and their operations will increase proportionately: "Not only will the probability of accidents increase . . . but pollution of the marine environment from normal tanker operations . . . are [sic] also likely to increase." S. Rep. No. 92-841, 92d Cong. 2d Sess. 22 (1972). Thus, even with relatively low discharge standards, adverse environmental effects may result and the accumulation of oil in the oceans will continue to grow.

As noted above, the objective of the Convention is the "complete elimination of willful and intentional pollution of the sea by oil . . . to be achieved by 1975, if possible. . . ." Thus, the Convention should adopt, if possible, a "no discharge" standard. Requiring segregated ballast capacity (see subparagraph [iii] below) can essentially achieve this goal, and there thus seems little reason for less absolute standards. In any event, before any proposed discharge standards could be supported, they must be justified environmentally, i.e., the damage to the marine environment produced at visible sheen, 15 ppm, and 60 liter per mile discharge limitations must be set forth and assessed. And, the Convention should only establish discharge criteria which meet the following two conditions: (1) conclusive evidence shows that it is not technologically feasible to reduce discharges below those levels, and (2) conclusive evidence demonstrates that discharges at such levels are not harmful within the meaning of Article 2, para. 3. The figures in brackets in Regulation 1(16) and Regulation 9 referring to parts per million discharges, ship sizes, rates of discharge, and nautical miles from shore, are not supported by any meaningful evidence indicating that they meet these conditions.

(iii) *The Environmental Necessity for Prompt Adoption of the Segregated Ballast and Double Bottom Requirements*—As mentioned above, meaningful discharge limitations must be buttressed by stringent design and construction standards. The interweaving of Regulations 11, 13, 15 and 20 of Annex I is thus critical. A requirement that oil carrying vessels possess the capability of carrying sufficient ballast for normal operations without recourse to cargo tanks (Regulation 11(1)(a), Regulation 11(2) and Regulation 13) is without doubt the most effective means for reducing damage to the marine environment from normal ballasting operations. The segregated ballast approach is effective because it eliminates the need to mix oil and water, and to wash cargo tanks to hold ballast which may be clean enough to discharge at a loading port. Moreover, there can be no question as to the environmental soundness of using a double bottom (with a height of B/15) (Footnote 33(i) to Annex I) to achieve part of the required segregated ballast capacity. Double bottoms would protect against accidental discharge caused by grounding incidents—the most common cause of tanker casualty—and the redistribution of hull strength resulting from incorporation of a double bottom will reduce or at least delay breaking caused by stranding, thereby reducing the frequency of catastrophic spills. Double bottoms are also likely to reduce operational pollution in at least two ways: (a) the

smooth cargo tank bottom resulting from a double bottom design should eliminate sludge build up and, thus, the need to clean cargo tanks to prevent this occurrence; and, (b) when tanks are cleaned to prepare for dry docking and overhaul, less wash water will be required for cleaning because of the elimination of structural members within the tanks.

The complete environmental advantage of a segregated ballast/double bottom system over load-on-top method (Regulation 15) or shoreside disposal (Regulation 20), is, we believe, beyond question, and is extensively documented in the Coast Guard's own studies. See United States Coast Guard, *Reports on Parts 1 and 2 of Study I: Segregated Ballast Tankers* (November, 1972 and February, 1973). Neither load-on-top procedure (even with elaborate oil content monitoring devices) nor shoreside disposal is an acceptable alternative to segregated ballast/double bottom design. To sanction the use of load-on-top procedure as an alternative would amount to nothing more than the maintenance of the *status quo*. This procedure, even in accordance with Regulation 15, will by no means eliminate oil discharges during deballasting operations, and, at best, it is only 80% effective in removing oil from overboard discharges. As the Senate Commerce Committee noted in its Report on the Ports and Waterways Safety Act of 1972, load-on-top procedure has,

"Obvious, inherent shortcomings . . . first, the rolling action of a ship in a seaway is not conducive to proper separation. Second, existing oil water separators have generally proven inadequate for tanker ballast operation and even potential improvement in the technology of oil water separators would certainly not seem capable of coping with the various oils carried by tankers that have specific gravities close to that of water. Third, the economic or geographic features of a particular trade may not allow sufficient time for a tanker operator to fully utilize the load-on-top procedure and, since a procedure rather than a design is involved, it is subject to *de facto* violations on a case by case basis." S. Rept. No. 92-724, 92nd Cong., 2nd Sess. (1972).

Similarly, shoreside reception facilities, unless subject to stringent discharge standards which are adequately policed and enforced, may merely transfer marine pollution problems to the shore, and, in fact, concentration of oil pollution in a specific shoreside location may be more harmful environmentally than regulated discharge at sea. Further, their creation may create substantial land use problems and have serious secondary impacts on the areas in which they are located. Finally, at present, the state of the art may not be sufficiently developed to indicate the type of shoreside facility best suited environmentally for each port. Especially as Regulation 20 is currently drafted, with no provision for the standards which would govern operation of shoreside facilities, it can scarcely be considered an adequate alternative to segregated ballast design.³

Given the environmental advantages of the segregated ballast/double bottom design, and the purpose of the Convention to *eliminate* operational pollution, we believe that such a design and construction standard should be made mandatory on *all* oil carrying vessels. Thus, in our view, the bracketed tonnage limitations in Regulation 11, para. 2, are far too high and wholly without justification. The Coast Guard studies referred to above have demonstrated that a segregated ballast/double bottom approach is cost effective down to ships as small as 20,000 dead weight tons.⁴ In point of fact, because load-on-top operations may not be able to be engaged in on smaller tankers, because, if such operations are engaged in, they may be relatively ineffective, and because smaller tankers carry cargoes of higher toxicity and often enter shallow, crowded harbor areas, applicability of the segregated ballast/double bottom requirement to such vessels is environmentally necessary.

Not only do we believe that the double bottom/segregated ballast standard should be imposed on all ships, but we believe that the Convention should require application of this standard as soon as possible after entry in force. Recognizing that some lead time may be appropriate in the shipping industry to design and produce a new ship, it would appear that the three year delivery requirement suggested in Regulation 1(5)(b) to Annex I should be the outside limit, while

³ Needless to say, the suggestion in footnote 32 that in-port disposal be considered, in every case, as a complete alternative to segregated ballast, is completely unacceptable.

⁴ That the requirement is feasible on smaller ships is demonstrated by the fact that, in the United States, intermediate and handy size tankers are being constructed, for Aeron Marine Shipping Co., and Chevron Marine Transport Co., respectively, with such features.

the cut-off dates for application set forth in Regulation 11(2) of Annex I are unduly liberal. Much earlier dates are necessary to meet the objectives set forth in IMCO Assembly Resolution A.237(VII).

The meaning of these cut-off dates is far from hypothetical. As a practical matter, the farther off application of the standards is, the greater the likelihood that the requirements will be ineffective until virtually the year 2000. A recent survey by the federal Maritime Administration shows that as of January 1, 1973 there were 533 oil carrying vessels on order or under construction throughout the world, including 276 tankers over 175,000 DWT; and, that the world tanker fleet contained an additional 750 tankers, including about 230 super-tankers, all built within the last four years. The survey also shows that virtually none of these tankers will incorporate double bottoms or a segregated ballast capacity. It is common knowledge that a worldwide shipbuilding boom is underway in order to meet skyrocketing demands for imported petroleum. If the applicable dates in the Convention are put off to 1980, however, it is likely that all the capacity needed to serve world needs in the 1980-2000 period will be constructed prior to such time, and thus the entire purpose of the Convention will be undermined. The United States must continue to advocate adoption of the earliest possible completion dates to trigger applicability of the Convention's design and construction standards.

(b) The Convention must provide for mandatory enforcement of its provisions.

Discharge and design standards will only be effective if they are enforceable. Indeed, the Convention itself is needed in part because of the failure to provide for adequate enforcement mechanisms in the International Convention for Prevention of Pollution of the Sea by Oil, 1954 (the "1954 Convention"). If the Contracting States are given full discretion to enforce or to decline to enforce the provisions of the Convention, or if they are not *required* to investigate alleged violations, the environmental protective purposes of the Convention may be substantially undercut. As it now stands, much of the language contained in the Fifth Draft is in the alternative, providing for either permissive or mandatory enforcement of various of its provisions. We believe that it is essential that the United States press for inclusion of the mandatory language and fully support provisions which vest power to prohibit discharges, investigate casualties or suspected violations and punish violators both in "flag" states and "port" or "coastal" states. If such mechanisms are incorporated in the final version, the Convention will not only be strong but will provide a significant precedent for future international agreements regulating ocean usage.

(i) *Mandatory Penalty Provisions.*—Article 4 of the Convention spells out the penalties and jurisdictional criteria to be applied whenever a violation of the Convention occurs. This provision, in either of the two Alternatives presented (Alternative I and Alternative II), provides for prohibition of discharges of harmful substances in violation of the Convention under the law of the Administration of the offending ship (the "flag" state) and/or the law of any other Contracting State when the discharge occurs within its "territorial seas" (the "coastal" state). Leaving enforcement solely to the "flag" state, especially if the flag is one of convenience, i.e., Liberia or Panama, would virtually guarantee that the Convention would not be fully enforced.

Alternative II appears preferable because it is more inclusive in scope and because it defines more precisely the rights and obligations of the Contracting States. Prohibition of "any violation of the requirements of the present Convention", the operative language in Alternative II, would appear to have a broader scope than the language contained in Alternative I which would only require prohibition of "any discharge of harmful substances or effluent containing these substances in contravention of the provisions of the Regulations." Presumably the former language provides Contracting States with the power to take action with regard to violation of design and construction standards as well as the actual discharge of effluents in excess of the Convention's limitations.

To work well, enforcement must be as automatic as possible. Thus, the language in Alternative II, which provides that an Administration "shall cause such proceedings to be taken as soon as possible," if it is informed of a violation and is satisfied that sufficient evidence is available to enable proceedings to be brought, is in the interest of a strong, effective, enforceable Convention. If Contracting States merely have an option to prosecute, then there is no assurance whatsoever that the Convention will in fact be enforced. Consequently, we would take strong issue with the suggestion of some delegations (set forth in Footnote

11) that the provisions of Alternative II to Article 4 are too stringent, and we urge that the United States recommend retaining the mandatory requirements to insure maximum effective enforcement of the Convention.

Similarly, we believe that the obligation which subparagraph 2 of Alternative II to Article 4 imposes on any Contracting State in whose territorial waters a violation occurs is eminently sensible. Such states should be required either to prosecute or to furnish to the Administration sufficient information and evidence so as to allow such State to prosecute. The entire enforcement package is further reinforced by the requirement in subparagraph 3 of this Alternative that, if such information is furnished to the Administration of the offending ship, then such Administration should inform the State whose waters are affected by the violation of the enforcement actions taken. In this way, there is a clear check, within the confines of the Convention, on enforcement actions taken by an Administration.

The provisions of Article 4 are also improved by the addition of the language suggested in Footnote 9. This provision would clearly increase the chances that any particular violation of the Convention would be prosecuted by enabling any Contracting State to cause proceedings to be taken against ships which enter its ports or offshore terminals, regardless of the fact that a violation, i.e., a prohibited discharge, might not have occurred within its territorial waters. Thus, if a ship which violates the requirements of the Convention and which trades on routes that bring it to several different Contracting States is not prosecuted by one of those States, there is at least a strong likelihood that it will be prosecuted by another. The threat of enforcement would be weakened, however, by the qualifications to the language suggested in Footnote 9, which either allow the Administration to preempt the prosecuting State or limit the prosecuting State's jurisdiction over violations, and we would oppose the inclusion of any such qualifications in the final Convention.

Finally, we believe that the adoption of Footnote 10 or a similar alternative should be supported, since to limit enforcement of a Contracting State to violations occurring within its "territorial seas"—presently, for example, only three miles in the case of the United States—may constitute an unnecessary limitation on its enforcement powers, especially if any law of the sea regime which is ultimately developed would provide for national, pollution control jurisdiction outside the area traditionally designated as the "territorial sea". Enforcement jurisdiction should be given to states for areas under "their national pollution control jurisdiction" (or equivalent language) in order to insure that the enforcement powers under the Convention are at least co-extensive with any jurisdictional lines established in a future law of the seas agreement.

(ii) *Certificates and Inspections.*—Control over ships required to hold Certificates under the Convention, achieved, in part, through broad inspection rights, is also important to the effectiveness of the Convention. Article 5, para. 2, provides that a ship's certificate of compliance must be accepted by an inspecting state unless there are "clear grounds" for believing that the condition of the ship or its equipment does not correspond substantially with the particulars of that certificate. As stated in our Fourth Draft Comments at p. 8, we believe that "clear grounds" are too stringent a test as a precondition for inspection. A state should be able to inspect and exercise control of ships in its ports or offshore terminals without having virtually to establish a violation. Limitations of time and personnel will serve to insure that inspections are not abused to disrupt commercial activity. Thus, we believe that the language suggested in Footnote 14, i.e., "reasonable grounds", should replace the "clear grounds" standard in subparagraph 2, and subparagraphs 4 and 5 of this Article as well.

Stringent action should be taken when it is determined that a ship does not have a valid certificate of compliance, and specification of action open to a state in such circumstances is appropriate. However, the action suggested, insuring that the ship in violation shall not sail until it can proceed to sea without presenting an unreasonable threat of harm to the marine environment, is not the optimum solution to the problem. Rather, the alternative suggested in Footnote 15, namely, that a ship should not be permitted to sail "until such deficiency is corrected", provides greater assurance of protection of the marine environment. At the least, permission for a ship to leave the port or offshore terminal should only be granted if the ship is required to proceed to the "nearest repair yard available", with the additional proviso that no such permission should be granted if the ship would "present a significant threat of harm to the marine environment."

Mandatory denial of access to ports and offshore terminals, with the added exception that entry would be allowed if for repair purposes, as provided for in

Article 5, paras. 4 and 5, is another important element of effective enforcement of the Convention. Although these provisions are now bracketed, we believe that they should be made part of the final Convention. The strictest language possible is required. Thus, in paragraph 4, reference should be made, as is suggested in Footnote 18, to denial of access to a ship which "does not comply with" the provisions of the Regulations rather than to a ship which "is not constructed in accordance with" the provisions of the Regulations. Further, denial of access should be mandatory rather than merely permissive, and we believe that if a Contracting State is "satisfied" that a ship is not in compliance, it need not "establish" such non-compliance. Finally, permission to leave the port or offshore facility under paragraph 5 should be conditioned on the voyage's not presenting "a significant threat of harm to the marine environment" rather than "an unreasonable threat of harm to the marine environment."

(iii) *Detection of Offenses.*—To insure effective enforcement, unnecessary obstacles should not be posed to inspection. Article 6, para. 2, as presently drafted, would only permit ships to be inspected in "loading ports." We agree with the suggestion in Footnote 21 that the language be expanded so as to cover ships "in ports and offshore terminals of any Contracting State." Further, addition of the language suggested in Footnote 22 to paragraph 2 of Article 6, which would *require* a report to be made to the appropriate authority if it appears that a discharge has been made or that there is a danger of discharge, will strengthen the enforcement web.

In addition, the investigatory provision now contained in Article 6, para. 5, should be made mandatory. This provision, combined with the proposals contained in Footnote 9 and our proposal to extend investigation beyond loading ports, will, if all are adopted, do much to insure that no violation of the Convention will go undetected or unprosecuted.

(iv) *Reporting.*—Reporting is an integral part of the enforcement mechanism. Any efforts to limit the circumstances under which reports should be made or to provide for permissive reporting should be opposed by the United States delegation. In particular, we disagree with the suggestion made by some delegations, see Footnote 32, that subparagraph 6(b) should be deleted. Moreover, we believe that the suggestions made in Footnote 33, that reporting should be made with regard to casualties which involve threats of discharge, is appropriate and should be included in the final Convention. Because of the importance of the reporting requirement, we would additionally recommend that the Convention include a sanction, perhaps triggered by a compliance test related to observation of discharges, to enforce the reporting procedure. The requirement of fullest possible reporting will serve to encourage compliance with the Convention and will also provide information regarding the frequency and volume of spills, which, in itself, should prove valuable for future efforts to control ship-generated pollution.

(v) *Casualty Investigation.*—Article 12, para. 1, also an element of the enforcement mechanism, would be strengthened by the addition of the proposal contained in Footnote 49(ii) which would enable a state to investigate casualties causing pollution which occur in areas generally recognized as international waters but which may affect the waters of the investigating state. Here again, by increasing the number of states which may investigate casualties (or violations of the Convention), the possibility of comprehensive enforcement is enhanced.

(vi) *Evidentiary Standard to Aid in Enforcement of Discharge Criteria.*—An appropriate evidentiary standard which would aid in the enforcement of the discharge standards is a final element in the enforcement mechanism. As Footnote 21 to Annex I indicates, there is unanimous agreement that such a provision is appropriate, at least as regards oil pollution. The four alternatives presented in Annex I for oil, however, very vastly in quality. Alternative (i) merely provides that evidence of "visible traces . . . shall be cause for investigation. . . .". Alternative (ii) even makes adoption of this evidentiary standard optional. And Alternative (iii) would require that it be "proven" that oil has been discharged. Only Alternative (iv) makes evidence of visible traces in and of itself "sufficient to establish a violation of this Regulation," unless rebutted by evidence to the contrary. Obviously Alternative (iv) is the strongest and best of the present formulations, for it places the burden of disproving an apparent violation upon the alleged violator. If anything, we believe that even this provision might be strengthened, by deleting the requirement that the visible traces be found "in the vicinity of the ship or its wake. . . .". Oil slicks can be carried over substantial distances and in many directions by ocean currents. If it is known

that only one ship has passed through an area where visible traces appear within a given period of time, then even if those traces are not seen "in the vicinity of the ship or its wake", the evidence would seem to be overwhelming that such traces derived from this ship.

(c) The Convention must provide for the most comprehensive possible regulation of ship-generated pollution.

A final element of an effective Convention is the scope of its impact on ship-generated pollution. It is obvious that unless the Convention is comprehensive in scope and provides for its application to the widest possible number of states and variations of situations, its ultimate impact on reducing pollution of the oceans will be severely limited. Broad application, moreover, means not just that the Convention must apply to a large number of states and a large variety of vessels, but that it must apply without reservation and must leave open the option for Contracting States to establish higher standards—to provide even greater protection for the oceans—should they so desire. A number of provisions in the Fifth Draft relate to these issues of expansiveness and inclusiveness, and we urge that every effort be made by the United States to secure the broadest possible provisions in the ultimate Convention.

(i) *Higher State Standards*.—Whether Contracting States will be able to take stricter measures within their own jurisdiction regarding any matters covered by the Convention is currently an open question under Article 8. It is also one of the most important and deserves special emphasis. We believe that the provisions currently contained in Article 8, para. 1, are essential to insure the broadest possible protection of the marine environment. From the United States' own point of view, this flexibility to protect national waters and coastlines is even more imperative. Congress, in the Ports and Waterways Safety Act of 1972 (Pub. L. No. 92-340, 46 U.S.C. § 391a), has specifically mandated that the U.S. Coast Guard establish design and construction standards for tank ships which are sufficient to protect U.S. coastal waters. Similarly, the Federal Water Pollution Control Act (Pub. L. No. 92-500, 33 U.S.C. §§ 1311 *et seq.*), authorizes the Environmental Protection Agency to set stringent discharge standards for U.S. waters. It need hardly be said that procedures for reaching international agreements are often lengthy and time consuming, that a long lead time is usually needed to gain international acceptance for proposed rules, and that agreements when reached, are often compromises and may not be stringent enough to meet our own environmental goals. If provision for higher state standards (both as regards discharge *and* design) is deleted from the Convention, the United States might be faced with the choice of rejecting the Convention or giving up its own commitment to the highest standards of environmental protection. Such a choice is simply unacceptable. Article 8, para. 1, is, we believe, a *sine qua non* to United States adherence to the Convention.⁵

(ii) *Application to All Ocean Equipment*.—whether the Convention should apply to "ships" engaged in offshore drilling or mining operations is an exceedingly difficult question. The definition of "ship" in Article 2, para. 5, now broadly applies to ocean equipment of "any type whatsoever" and includes "fixed or floating platforms." There is substantial pressure to narrow this definition and exclude such equipment from the Convention's coverage. While there may be some valid reasons for concluding that regulation of equipment engaged in ocean exploration and exploitation should be left entirely to any law of the sea regime which is ultimately developed, we are basically of the opinion that, at least for the immediate future, operational discharges (though perhaps not developmental activities) from such equipment should remain subject to the Convention.

As offshore exploitation of the oceans' mineral resources increases, pollution generated from submersibles, drill ships, and floating and fixed platforms will become an increasingly serious problem. These hybrid vehicles and equipment have many of the same characteristics as conventional vessels, especially as regards the problems of disposal of wastes, sewage, garbage, sludge and other oily residues. To the extent that they are mobile, their discharges in transit are indistinguishable from those of other vessels. While some of the major problems posed by such equipment, namely discharges resulting directly from exploitative activity (pipeline blowouts, drill breakage, etc.)—significant oil polluting incidents off the United States coasts in recent years have been associated with drilling activities in the Gulf of Mexico and the Santa Barbara Channel and approximately 2% of all oil discharged into the oceans can be traced to such

⁵ It is obvious that Article 8, para. 2, is inconsistent with Article 8, para. 1, and we firmly believe that such provision should be deleted from the final Convention.

activities—might appropriately be left to regulation in a future of the sea regime which would comprehensively control offshore development, nonetheless there seems little reason not to regulate now the “operational” discharges from such equipment in the same manner as those from oil tankers or other conventional carriers. This is all the more important because the regulation of such discharges by any future law of the sea regime is speculative at best at this time. Regulation of all ocean equipment in a single Convention whose focus is the prevention of pollution (and not promotion of development) simply makes good sense. If the law of the sea regime ultimately establishes rules covering discharges from offshore exploitation vehicles and such rules are preferable to the ones in the Convention, then, of course, the law of the sea rules can merely supersede the Convention.⁶

(iii) *Application to Ships in All Trades.*—The Convention should apply to all ships, regardless of the trades in which they are engaged. Regulation 5 of Annex I, now provides that only ships which are engaged on “international voyages” shall be issued International Oil Pollution Prevention Certificates. This is an undue limitation on the certification requirement. Ships which engage in coastwise trade but which travel in international waters should also be subject to the certification requirement. Indeed, ships which engage in short voyages and enter many harbor areas during their lives present substantial threats of oil pollution at least equal to those posed by ships which engage in the long haul trades. Higher accidental risks are associated with frequent entry into narrow, shallow and crowded harbor areas, and operational discharges from tank ships in the coastwise trades, insofar as such discharges are made near to biologically sensitive bays and estuaries, pose grave environmental hazards, especially in light of the fact that such vessels tend to carry white oils of high toxicity.

For the same reasons, we strongly oppose the suggestion in Footnote 20 to Annex I that the mileage limitations on discharge not apply to ships engaged in coastal voyages and the suggestion made in Footnote 31 to Annex I that segregated ballast capacity for ships trading within “[150]” miles between oil loading and oil delivering terminals should be left open to the option of the Administration. The analysis set forth above militates strongly in favor of segregated ballast and strict discharge limitations on ships engaging in short voyages, and exemption of such ships from the segregated ballast and discharge requirements would substantially weaken the Convention’s pollution control objectives.

(iv) *Application to Military Vessels.*—Not only must the Convention apply to various kinds of ships in various trades, it must also apply to vessels with military as well as civilian missions. Military vessels represent a substantial portion of the world’s fleet. Because of their generally large crews, they pose particularly difficult sewage and waste problems. Moreover, many such vessels are tankers equipped to carry fuels and other petroleum products. For example, the United States Navy, through the Military Sealift Command, has recently procured nine 24,000 ton vessels to carry jet fuels and diesel oils to serve the needs of the military. These are not warships, and they are intended for use in commercial operations after a period of service to the military. They have neither segregated ballast nor double bottoms. It is obvious that ships such as these can and should be subject to the provisions of the Convention, and we object now, as we did in our Fourth Draft Comments, to the inclusion, in Article 3, para. 2, of a broad-scale exemption for military vessels. We urge adoption of the original proposal of the United States in the Ocean Dumping negotiations which would have left military vessels immune from the enforcement powers of foreign countries but subject to the regulatory requirements of the Convention.⁷

(v) *No Suspension in Time of War.*—Provision for suspension in case of war is not made in the present Convention,⁸ although its insertion has been suggested in Footnote 43. We reiterate the views expressed in the Fourth Draft Comments at p. 12 that such an Article is not needed, and should not be included in the final Convention. As drafted, it would literally allow for suspension of the Con-

⁶ If fixed and floating platforms, drill ships and the like are to be regulated in the Convention, the meaning of the exclusion of the release of harmful substances related to offshore exploitation from the definition of “discharge” in article 2, para. 4(b) (ii), should be clarified to indicate that, even if mining or drilling activities per se are unregulated, operational discharges from equipment engaging in such activities are covered by the Convention. The phrase “directly arising from” in the cited subparagraph is too vague to do the job.

⁷ If the Convention must exempt military vessels, then, at the very least, we recommend that the narrowest acceptable formula be chosen; footnote 8 appears to be a start in the right direction.

vention by *all* signatory nations in the event of even minor strife anywhere in the world. The only rationale for this provision would be to suspend operation in limited ocean areas affected by hostilities for reasons of safety of life or vessel. However, the Article does not provide for such limited suspension and, in any event, the regulations to each of the Annexes which provide that discharges for the purposes of securing the safety of a ship, saving life at sea or resulting from damage to the ship or its equipment are excepted from the prohibitions of the Convention, seem to provide sufficient flexibility to cover wartime conditions.

(vi) *One Convention Only*.—Footnote 1 to the Title of the Convention suggests that there is a possibility of some fragmentation of the regulation of ship-generated pollution. Our basic position, as stated in the Fourth Draft Comments at pp. 2-3, is that ship-generated pollution should be regulated in a single, comprehensive Convention, and we can perceive no sound reason for the creation of several agreements. With respect to amendments in particular, a single, comprehensive Convention has substantial advantages, since improved, fast, broadly applicable amendment procedures could be most successfully negotiated if negotiated once, i.e., for application to a comprehensive Convention and its Annexes rather than to several conventions. Moreover, considerable economies of time and effort can be realized by all parties in negotiating a single agreement.

(vii) *All State Accession*.—Effectiveness of the Convention is further enhanced by the widest possible adherence to it. Thus, we believe that the United States should support and advocate the "all states" accession clause in Article 13, para. 1, and urge that the bracketed language in such provision be retained.

(viii) *No Reservations*.—We believe, as stated in the Fourth Draft Comments at p. 14, that the Convention should contain a general prohibition against a state's making reservations to the requirements of the Convention and to the mandatory and optional Annexes. It is obvious that if reservations can be made willy-nilly, the force of the entire Convention will be vitiated. Alternative (i) of Article 14 is therefore absolutely essential to a strong Convention and we urge the United States to oppose any inroads into this principle.

(ix) *Mandatory Annexes*.—As stated in our Fourth Draft Comments at p. 13, we believe that any Annex which regulates actual or potential major sources of pollution should be made mandatory. It is obvious that Annexes I and II must remain mandatory, or the Convention will have little meaning. Making Annexes III through V mandatory would be desirable. At the least, as a *quid pro quo* for agreeing that such Annexes may remain optional, the United States should insist that Annexes I and II work a real and substantial improvement in the regulation of vessels which carry oil and harmful chemicals.

2. SPECIFIC COMMENTS

In addition to the three major areas of concern outlined above, we have the following specific comments on the Fifth Draft, referenced to the appropriate Article or Regulation:

ARTICLES

Preamble, para. 4.—As indicated in our Fourth Draft Comments at pp. 1-2, we believe that the United States should oppose "replacement" of the 1954 Convention by means of any provision in the Convention which would purport to abrogate it upon entry into force. All the numerous parties to the 1954 Convention may not promptly become or perhaps ever become party to the present Convention, and, in those ocean areas in which coastal states have no power to regulate foreign flag vessels the only regulation would arise under the 1954 Convention. Thus we urge the United States to support adoption of the language suggested in Footnote 3 in order to make clear that the 1954 Convention is only superseded by the present Convention as between contracting parties to both Conventions.

Article 2, para. 2.—The answer to the question of whether the word "authority" is better than the word "jurisdiction" in the definition of "Administration" (See Footnote 4) depends, in our view, upon which of these two words would provide the most expansive authority to regulate. Most probably it is the word "authority", since it is possible that a platform could be owned or operated by nationals of one Contracting State, thereby falling under its "authority", but be operated in an area under the "jurisdiction" of another Contracting State. Since the word, "authority" would therefore allow for double enforcement, its inclusion in the final Convention is consistent with the general flag state/port or coastal state enforcement scheme and would appear preferable.

Article 2, para. 3.—We assume that the broad definition of “harmful substance” includes radioactive substances, and we believe that any exclusion of radioactive substances from the scope of the Convention would significantly weaken it from an environmental and political point of view and should be opposed by the United States. Moreover, if the International Atomic Energy Agency has made or will make recommendations regarding radioactive discharges, we urge that their application be made mandatory in the Convention. If this solution is not feasible, we recommend the United States urge the adoption of a resolution recommending formulation within a given period of time of an annex relating to radioactive discharges.

Article 2, para. 4(a).—The definition of “discharge” should include the language suggested in Footnote 5 which may be useful in avoiding a possible inference that a “release” means only an intentional or voluntary act.

Article 3, para. 1.—Some states, such as the United Kingdom and the Netherlands, maintain the view that all parliaments of territories whose foreign relations they conduct, must act before ratification on behalf of any of them or the metropolitan state itself can be deposited. The bracketed language, therefore, would enable these states to ratify the Convention and then extend its application to their territories. Consequently, it should be retained in order to facilitate the earliest possible entry into force of the Convention. The same comments apply to the bracketed language in Regulation 1, para. 8, to Annex 1.

Article 10.—Of the three dispute settlement alternatives presented, we favor adoption of Alternative II (arbitration), and believe that the dispute settlement provisions, contrary to the suggestion in Footnote 44, should be made mandatory. Alternative II would formalize a uniform arbitration procedure for handling disputes. It is clearly preferable to Alternative III which is little more than an exhortation to settlement and which would almost necessarily involve time consuming and fruitless discussions over what method to employ for resolving disputes. Moreover, reliance on the International Court of Justice—Alternative I—would involve a commitment to a slow, arduous and cumbersome procedure and would place highly technical issues before a tribunal which has no special expertise to resolve them. Arbitration, by contrast, which will give each state party to a dispute the power of appointment over one member of the arbitration board and which, in all likelihood, would create a mechanism possessing the technical expertise to enable it to resolve highly technical questions, appears far the most sensible and least time wasting alternative.

Article 17.—While we believe, as stated in our Fourth Draft Comments at pp. 14–15, that provision should be made for uniformity and rapidity of acceptance of amendments, the Convention should include a provision to prevent adoption of an amendment by way of tacit acceptance which would provide for less stringent standards.

We oppose inclusion of the bracketed materials in Paragraphs 3(a)(v), (b)(v) and (c)(v) which would allow Contracting States to exempt themselves altogether from giving effect to provisions of any amendment or to exempt themselves from an amendment’s application for a period not exceeding twelve months from the date of entry into force of such amendment. To permit total rejection of an amendment might well riddle the Convention with exceptions and could substantially hamper its effectiveness, while even a twelve month grace period, particularly with respect to changes in substantive requirements embodied in the Annexes, would be undesirable since these should be given effect as soon as possible so as to ensure the maximum feasible protection of the oceans.

ANNEX I

Regulation 1, para. 1.—Since animal and vegetable oils can cause severe damage to the marine environment, we favor the proposal in Footnote 1(i) which would include them in the definition of “oil”. Further, we believe that the definition of “oil” should remain otherwise in its present form, with the listing of substances in Appendix I not limiting the generality of the definition.

Regulation 1, para. 5(a).—The deletion suggested in Footnote 2 should be opposed, since deletion of the language referring to a building contract might well result in exempting a large number of ships from the operation of the Convention.

Regulation 1, para 10.—See our comments on Regulation 12, *infra*.

Regulation 1, para. 17.—See generally our comments on discharge standards at pages 5 to 7, *supra*. We would note additionally that the 15 ppm standard

may be inconsistent with the evidentiary standards in Regulation 9 which would make "visible traces" sufficient to establish a violation of the discharge limitations. We would also question whether discharges of less than 15 ppm would not accumulate or make slicks. In any event, the requirement should be such that any effluent is sufficiently dilute so as not to form a slick in calm waters.

Regulation 1, para. 18.—If in fact the definition of "length" would penalize twin screw/twin rudder ships, we would agree with the suggestion in Footnote 8 that this definition should be modified, perhaps to define length as 85% of the full load waterline. Twin screws and twin rudders provide significant maneuverability advantages, thereby reducing the risks of accidents, and every effort should be made to encourage their incorporation on new vessels.

Regulation 2, para. 1.—As noted above, we believe that the Convention must apply to "stationary ships", floating platforms and the like. We would agree that the term "stationary ships" needs improvement to give it the most inclusive possible effect.

Regulation 2, para. 4(a).—For the sake of inclusiveness, we believe that the definition of a "novel type of craft" should be as broad as possible, and we would support the suggestion in Footnote 10 that a more suitable text be developed. Conceivably, there are other classes of vessels which might also require special treatment and these should be identified with particularity, or criteria should be established for so identifying them. We further believe that the procedures for finding the equivalency and granting the exemption should conform to those provided in Regulation 3, and both such regulations should require, in addition to a description of the exception, the reasons for the finding. It should also be made clear that arbitration procedures are available for determining the correctness of the exception.

Regulation 4(1).—The gross tonnage limitations now bracketed in this provision, as well as other gross tonnage limitations which appear throughout Annex I and the other Annexes, should be assessed to determine if they are the lowest possible which can be achieved in order to provide for maximum protection of the oceans. Certainly, any efforts to significantly raise these tonnage limitations should be opposed by the United States.

Regulation 6, para. 4.—Provision for denial of certification to ships entitled to fly the flag of noncontracting governments is an essential inducement to become party to the Convention, and any effort to delete this provision should be opposed.

Regulation 9, paras. 1(a)(ii) and 1(a)(iv).—Our views on discharge limitations in general are presented above at pp. 5 to 7, but we would take specific exception to the 50 miles and 60 litre limitations. The 50 miles limitation should at least be extended to 100 miles, as suggested in Footnote 16, thereby further protecting sensitive coastal regions (though the key to protection is not the number of miles away from shore—a slick can travel 50 miles in a day—but whether sufficient oil is discharged to accumulate). As to the 60 litre limit, this appears to have been chosen based upon a primitive experiment, not geared to biological criteria, with respect to what quantity of oil could be *seen* if discharged. The rate of discharge, moreover, is substantial (3,750 barrels per 10,000 mile voyage) and biological impact of such a rate is uncertain.

Regulation 9, paras. 1(a)(vi) and 1(b)(vi).—We would urge that if discharge standards such as those presently proposed are adopted, the requirement for an operational, tamper-proof oil discharge monitoring and control system be mandatory. Only if such a system does exist and is in operation, can there be effective control and enforcement of the discharge standards. Similarly, the slop tank requirement referred to in subparagraph 1(a)(vii) is important to achieve effective discharge control.⁸

Regulation 9, para. 1(a)(viii).—There is no question that bilge pumpings should be required to meet stringent discharge standards. In fact, we do not understand why any discharge is allowed, since Regulation 17 specifically provides for a slop tank to hold bilge pumpings for shoreside reception.

Regulation 9, para. 1(b).—In general, if all ships are required by Regulation 17 to have holding tanks for oily residues, we question why any discharge should be permitted if acceptable shoreside reception facilities are available.

⁸ Upon the assumption that discharge limitations similar to those currently embodied in regulation 9 are included in the final Convention, we should seriously question the rationale for distinguishing in regulation 9(1)(a)(v) between ships over and ships under 100,000 dead weight tons. The standard should be the same for ships of all sizes and should probably be reduced by at least a factor of five.

Regulation 9, para. 1(b)(iv).—Since oils discharged from vessels other than tankers are just as harmful as those discharged from tankers, there appears no justification for the lower, i.e., 10 vs. 50 or 100, mileage limitation.

Regulation 12.—As set forth in our Fourth Draft Comments at pp. 15–16, we believe that the need for special areas depends upon whether the Conference can agree upon a single, strict regime to be applied to all ocean areas. Such a regime would be preferable to a Convention containing several special areas. Indeed the need to designate special areas tends to indicate (1) that ship-generated oil pollution has already reached unacceptable levels in some areas and (2) that the general discharge criteria established in the Convention for non-special areas are not sufficient to provide full protection against such pollution.⁹

Regulation 13, para. 3(b).—The segregated ballast requirement should be spelled out in accordance with the bracketed language in this subparagraph, and, if segregated ballast is required for smaller vessels, as it should be, criteria should be developed to define the appropriate ballast levels for such vessels.

Regulation 15.—As set forth above at pp. 8 to 9, retention of oil on board should not be considered an alternative to segregated ballast (though it may supplement it as regards the problem of disposal of tank washings). However, if ships are permitted to meet the requirements of the Convention through adoption of this alternative, we have several specific suggestions. First, in Regulation 15, para. 2, we believe that the reference to being equipped with “adequate means for cleaning cargo tanks” should be more specific, and that recirculating systems, linked with high capacity, fixed tank cleaning equipment, which are an effective means of reducing pollution resulting from tank washings, should be required, coupled with adequate safety measures, such as a gas inerting system. Second, each of the specific equipment requirements set forth in subparagraph 3 should be required and any effort to delete them should be opposed. As noted above, it is better to rely on technology than human competence to reduce oil discharges. In particular, provision for an oil content monitoring arrangement with automatic shutdown and recording equipment to make a permanent record (paragraph 3(b)) is necessary to ensure that effluents will not exceed specified discharge levels. This paragraph should be clarified by adding language to the effect that the oil content monitoring requirement must not just provide for “automatic recording” but for “automatic shutdown”.

Regulation 16.—The effectiveness of the levels specified for oily water separators and oil discharge monitoring and control systems should be geared to the best available technology. We understand that systems are currently available which can separate out oil down to almost 5 ppm, rather than 100 ppm. If this is the case, standards should be established at such levels and tied in with the discharge levels in Regulation 9. Deletion of the bracketed material in subparagraph 5 of Regulation 16 is also necessary in order that discharge levels can be monitored and enforced.

Regulation 17.—In a segregated ballast tanker, consideration should be given to requiring that there be a tank or tanks of adequate capacity to hold tank washings as well as oily residues, for discharge into shoreside reception facilities. Such a requirement would reduce operational discharges from segregated ballast vessels to zero.

Regulation 20.—As noted above, see page 9, *supra*, shoreside reception facilities are only an acceptable alternative if there are adequate controls over and enforcement of landside activities. As presently drafted, this Regulation is simply insufficient to ensure environmental protection. If shoreside facilities are to be an alternative, stringent standards should be established, and provision made for effective inspection and enforcement by IMCO officials or other contracting parties.

Regulation 21, para. 2.—The bracketed material should be retained in order that the completest possible record of tanker operations can be developed.

Regulations 22–25.—These four regulations, all of which relate to cargo tank size limitations, provide virtually no improvement over existing industry practice, since they are at the top of the scale of what is now incorporated on VLCC's. The actual cargo tank size limitations presently provided for in Regulation 24 should be substantially reduced. The limitations contained in the Fifth Draft would allow 141,519 barrels to be contained in any single wing tank and 314,487

⁹ If the special area concept is retained, we would suggest that other areas than those listed, i.e., the Caribbean and North Sea and the Great Barrier Reef, be considered for treatment as such.

barrels to be contained in any center tank. It is obvious, therefore, that the complete loss of cargo from a single tank meeting these size limitations could be environmentally disastrous. In terms of prevention of accidental pollution, reduction in tank size would necessarily reduce the amount of outflow from any single tank and thereby provide substantial environmental protection. The federal Maritime Administration recently estimated, in its final environmental impact statement on its tanker construction program, at p. VI-57, that cutting tank sizes by one half on a 265,000 DWT tanker could yield a reduction of about 60 cubic metres per year, or 12%, in accidental pollution.

Regulation 25 bis.—We support inclusion of provisions, such as those suggested in Footnote 52, which would require on-shore and on-board equipment capable of transferring cargo from compartments in the case of accidents to oil tankers. Such requirements necessarily would contribute to the reduction of the scope of any oil spill resulting from tanker casualties. Consideration might also be given to requiring spill containment equipment to be available for such emergencies.

Regulation 26.—As noted above, see page 18, *supra*, we believe that stationary ships should be covered by the Convention, and that the brackets surrounding this provision should be removed. As with other “ships”, however, discharges should be the lowest technologically feasible and not cause environmental damage. We thus question application of the clean ballast standard (subparagraph 1(a)). We further believe IMCO, not the Administration, should establish appropriate equipment specifications (paragraph 6). Finally, we believe that the metric ton limitation on reporting (paragraph 12) should be deleted—all discharges should be reported, as with other ships.

ANNEX II

Regulation 1, paras. 1 and 4.—As stated in our Fourth Draft Comments at p. 20, we believe that gas carriers should be regulated under this Annex. Although paragraph 29 of document PCMP/8, 7 March 1973, p. 9, indicates that it was the general feeling of the preparatory meeting that the hazard to which *liquified* noxious substances in bulk mainly related was *air* pollution rather than directly to water pollution, and therefore regulation in the present Convention was not “appropriate”, the more relevant consideration is that it makes sense to regulate ship-generated pollution, of whatever nature, in a single, comprehensive Convention which establishes discharge and design standards. LNG carriers, in particular, do pose significant safety and environmental hazards, and thus should be regulated, to the extent possible, in the same manner as other vessels carrying potentially harmful substances.

Regulation 2, para. 1.—As noted above, see page 25, *supra*, we support the suggestion in Footnote 1 that the term “stationary ships” be improved.

Regulation 3, paras. 2 and 3.—We recommend that Appendix I to Annex II include specific procedures for the tests to be used in determining whether a substance meets the guidelines for categorization. We further urge that the bracketed language in para. 3 be included in the final Convention—to protect the environment it is safest to assume that chemicals whose properties are relatively unknown are harmful rather than benign.

Regulation 5.—As noted above with regard to Annex I, Regulation 9, the environmental justification for stated discharge levels must be made plain. A discharge level should only be established when it can be shown that a lower level is not technologically feasible and that discharges at the stated levels will not cause significant environmental damage. General limitations on chemical discharges are especially difficult since each substance may have a different degree of dilution, solubility, dispersion, volatility, etc., under varying circumstances and since the environmental effects of any chemicals are unknown. As with oil, the goal must be the complete elimination of operational discharges.

In order to achieve fullest possible protection of the oceans, we would support as well the suggestion in Footnote 5 that coastal states be permitted to impose more stringent discharge limitations.

Regulation 6 of Fourth Draft.—This Regulation, which provided for establishment of appendices to contain lists of marine resources requiring further protection from discharges and of water quality criteria for protection of the marine environment, has been deleted from the Fifth Draft. Our Fourth Draft Comments recommended, at p. 21, that this regulation be included in the body of the Convention and apply to oil, sewage, and garbage as well as to the noxious substances of Annex II. This recommendation still appears appropriate.

Regulation 7.—See comments on Annex I, Regulation 20, *supra*. Effective environmental protection requires stringent standards for on-shore reception facilities, accompanied by appropriate enforcement mechanisms, and these are lacking in the present Convention.

Regulation 9, para. 2.—Development of comprehensive recording requirements is essential to enforceability of the Convention, and we believe inclusion of this provision, in expanded form, should be strongly supported.

Regulation 9, para. 6.—Inspections should be allowed in off-shore terminals, as well as coastal ports, to effectuate enforcement of the Convention.

Regulation 10.—While para. 2 of this Regulation specifies explicit survey requirements for ships other than chemical tankers, paras. 1(a) and 1(b) provide no explicit survey requirements for chemical tankers. We strongly recommend that explicit survey requirements for chemical tankers be developed and included in the Convention.

Regulation 11.—As noted in our Fourth Draft Comments at p. 20, we believe that perhaps the principal defect in Annex II is the failure to set out genuine, uniform, enforceable construction requirements for chemical tankers. We question whether the provisions of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk is sufficient in this regard. In any event, it must be made clear that compliance with the instructions issued pursuant to paragraph 2 is mandatory and enforceable by port and coastal as well as flag states. Otherwise, the Regulation is ineffectual.

Regulation 12.—This provision should be included in full in the final Annex.

ANNEX III

Footnote 1.—Footnote 1 indicates that a number of delegations believe that the subject of this Annex has not been considered in sufficient detail to allow its incorporation in the Convention, and therefore suggested that these provisions be established in the form of recommendations appended to a Conference Resolution. We strongly recommend against adopting this approach and favor establishing an Annex to the Convention on this subject which would contain uniform discharge and design criteria enforceable by coastal and port as well as flag states.

Regulation 1.—We note with approval the expansion of the applicability of the regulations to all ships carrying harmful substances in packaged form, in cargo containers, or in portable tanks. We urge that the United States recommend that IMCO, and not the individual Contracting States, issue uniform, detailed instructions on packaging, marking and labeling, documentation, storage, quantity limitations, discharge by jettisoning, and leakages for preventing or minimizing pollution of the marine environment by harmful substances.

Regulation 2.—This Regulation contains no specific packaging requirements and should be rewritten to define what minimum standards are.

Regulation 3.—Labels should reveal the common generic term, if any, as well as the organic nomenclature, to insure the completest possible identification.

Regulation 4.—We believe the addition of a requirement that a "hazardous cargo flag" be flown in order to clearly alert other ships and coastal states of the danger in case of accident would be appropriate.

Regulation 5.—This provision is too general—precise requirements for stowage should be set out.

Regulation 6.—This provision merely states that certain harmful substances which are very hazardous to the marine environment shall either be prohibited for carriage or shall be limited as to quantity which may be carried aboard any one ship. No standards are provided or even hinted at for determining this class of substances. This provision must be clarified through the development of detailed standards.

Regulation 8.—The Convention itself should require that recovery efforts be given priority treatment by Contracting States.

ANNEX IV

Regulation 2.—The proposed 10 year grace period in para. (b) is unnecessarily long. We support the suggestion in Footnote 2 that, at a minimum, it should be reduced to five years.

The suggestion in Footnote 3 that certain passenger ships be exempted is unwarranted. It is precisely large passenger vessels (as well as military vessels) which pose the greatest sewage problems.

Regulation 3.—We reiterate our earlier position in the Fourth Draft Comments that the certification requirement should be a mandatory one and subject to the enforcement provisions of Articles 4, 5 and 6 of the Convention. We also note our earlier view that the “satisfaction of the Administration” in determining whether equipment meets the discharge requirement of Regulation 4 is too subjective a standard. This provision should make clear that a certificate shall be issued after survey of the ship demonstrates that it is equipped with equipment capable of meeting the specific standards of Regulation 4. As with the other Annexes, we favor IMCO itself establishing uniform equipment requirements.

Regulation 4(1)(a).—This provision, which prohibits the discharge of sewage except when a ship is discharging at a distance of more than “[———]” miles from nearest land and has in operation suitable sewage treatment equipment which is capable of satisfying certain specified criteria, should ultimately establish a mileage limitation as far offshore as is appropriate to ensure protection of amenities. A three mile limitation would surely be insufficient. Moreover, special areas around particular beaches and scenic coasts should be designated for stiffest possible prohibition of discharges. Further, there is no justification for allowing the discharge anywhere of solid wastes, since maceration equipment, which will transform wastes into micro-particulate matter, is available and will *insure* that wastes will not reach the shore. Finally, we note our support for the suggestions in Footnote 7 that more stringent state standards should be permitted and in Footnote 12 that subparagraph 1(c) be deleted.

Regulation 4, para. 1(b).—The 10,000 per litre coliform count in subparagraph 1(b)(i) which is the present Environmental Protection Agency standard under the Water Quality Improvement Act, should be retained, and the word “floating” in subparagraph 1(b)(ii) should be deleted since suspended solids may also cause harm, and, in any event, with the availability of maceration devices, there is no justification for allowing any solid waste discharge.

Regulation 5.—We are pleased to note deletion of the cargo exception and urge the United States to stand by the present version of Regulation 5.

Regulation 6.—See comments on Annex I, Regulation 20, and Annex II, Regulation 7, *supra*.

ANNEX V

Regulation 3.—The absolute prohibition of discharge of plastics (subparagraph 1(a)) is a very good provision and any efforts to modify it should be opposed. Such an absolute prohibition, moreover, might well be applied to wood damage, lining and packing materials (subparagraph 1(c)) and “other garbage” (subparagraph 1(d)), since these substances can easily be carried back to shore (for recycling, if possible), since there is no compelling argument in favor of allowing any discharge at all, and since their discharge fouls the oceans in ever increasing proportions.

Further, we urge, as we did in our Fourth Draft Comments, that, if discharges are allowed, a requirement be established for disinfection of materials, and the most extensive possible mileage limitations (i.e., 50 miles rather than 25 miles in subparagraph 1(c)(i)) be supported. Once again, the language suggested in Footnote 2 should be included in the final Convention to permit coastal states to take special measures to protect their national marine environment.

Regulation 4, Fourth Draft.—This Fourth Draft provision contained a generalized statement that ships to which the Annex applies be provided with suitable equipment for handling and treating garbage. This provision has been eliminated from the final draft of the Convention. We urge its reinstatement as a regulation specifically defining criteria by which to govern “suitable equipment” as well as provisions for inspection and enforcement of the Regulation.

Regulation 4.—The language suggested in Footnote 7 appears nowhere else in the Convention. Its inclusion would be unjustified—priority should not be given to protection of cargo over protection of the marine environment—and we urge the United States to oppose any efforts to incorporate it in the final Convention.

Regulation 4, para. C.—Accidental loss of synthetic fishing nets is a serious problem, and we recommend that IMCO mandate specific “reasonable precautions, i.e., buoying and marking, to prevent such loss.

Regulation 5.—See comments on Annex I, Regulation 20, and Annex II, Regulation 8, *supra*.

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If you have any questions with respect to the comments presented above, or if you wish us to supply any further information, please do not hesitate to contact

either of the undersigned. We will be submitting shortly, under separate cover, comments on the Draft Protocol Relating to Intervention on the High Seas in Cases of Marine Pollution by Substances Other Than Oil.

Very truly yours,

ELDON V. C. GREENBERG,

RICHARD A. FRANK,

Counsel to Sierra Club, Environmental Defense Fund, Natural Resources Defense Council, National Parks and Conservation Association, and Friends of the Earth.

STATEMENT OF JESSE M. CALHOON, PRESIDENT, NATIONAL MARINE ENGINEERS' BENEFICIAL ASSOCIATION, AFL-CIO

My name is Jesse M. Calhoon, I am President of National Marine Engineers Beneficial Association, AFL-CIO. MEBA is a labor organization representing, among other groups, licensed marine engineers aboard American flag seagoing vessels.

More than any other labor organization in the maritime industry MEBA recognizes the problems created by oil pollution. As licensed marine engineers our members are acutely aware of the damage to our navigable waters caused by oil pollution. We are aware of the need for adequate legislation in this area and support all reasonable efforts to eliminate or minimize the serious hazards created by oil pollution.

S. 1067 is intended to impose more stringent restrictions on the discharge of oil and oily mixtures from vessels anywhere on the high seas. It is intended to expand the prohibitions on the type of discharge, the discharge rate and the quantity of oil discharge. It is also intended to expand the area in which such discharges are prohibited.

We support these objectives. We agree with the imposition of more severe restrictions on pollution of the high seas. MEBA supports legislation which will limit the discharge of oil or oily mixtures by oceangoing vessels and thus reduce pollution on the high seas.

I cannot help but point out that the application of this legislation and of the Oil Pollution Act of 1961 are limited to American flag vessels. The Oil Pollution Act of 1961 defines the term "ship" to mean any seagoing vessel of any type whatsoever of American registry or nationality. Among the category of vessels excluded from the definition are naval ships and ships used as naval auxiliaries.

I think it is extremely unfortunate that this kind of limitation must be placed on the applicability of this legislation. It is frankly absurd for the Congress of the United States to impose restrictions on American flag vessels when foreign flag vessels are not subject to the same requirements and would be permitted to pollute the high seas without penalty.

I am aware that the limitation of this legislation to American flag vessels may be the extent to which Congress has the power to legislate. But I want to emphasize that the effect of this legislation, and the Oil Pollution Act of 1961, is that a foreign flag vessel may enter American waters and discharge oil or oily mixture while an American vessel is, by this legislation, prohibited from doing so.

It is true that Section 6 of S. 1067 adopts for the future construction of tankers Annex C of the convention relating to tanker arrangement and limitation of tank size. Hopefully, this will mean that American flag tankers will in the future be constructed in a fashion so as to limit their discharge of oil and oily mixture. The proposed legislation permits the Secretary of Transportation to accept certificates of compliance by tankers which are issued pursuant to the convention by other nations. It does empower the Secretary to deny foreign tankers which do not comply with Annex C access to United States ports or offshore terminals. However, I would point out that the standards of other nations in regard to compliance with the convention may be far lower than those imposed by the Secretary of Transportation and this would create only another advantage for foreign flag tankers over similar vessels flying the flag of the United States.

The most serious aspect of this legislation to MEBA is its imposition of penalties upon licensed officers as provided in Section 7 of S. 1067. That Section states in its first paragraph that any person who "willfully" discharges oil or oily mixture may be fined and imprisoned for each violation. Section 7(b) further provides that any person who "willfully or negligently" discharges oil or oily mixture is liable to a substantial civil penalty of a large monetary amount.

Section 6 of the Oil Pollution Act of 1961, 33 U.S.C. 1005, states simply that any person who violates any provision of that chapter is guilty of a misdemeanor and, upon conviction, shall be punished by a fine or imprisonment. S. 1067 continues this form of penalty, although it increases the amount of the possible fine and adds a provision for a civil penalty for a willful or negligent discharge of oil or oily mixture.

The effect of the proposed legislation is that if a licensed engineer causes or permits the discharge of oil (absent a finding of certain exonerating emergency conditions) he is guilty of a crime despite the fact that he may be wholly without fault, despite the fact that the equipment aboard the vessel may be latently defective, unreliable or obsolescent and despite the fact that the engineer may take all reasonable steps to prevent oil discharge.

Section 2 (b) of the Oil Pollution Act of 1961 defines the term "discharge" to mean "any discharge or escape howsoever caused". This broad or encompassing definition would seem to cover any kind of escape of oil or an oily mixture, as those terms are defined by S. 1067, from a vessel. Thus, even if a discharge is caused by factors beyond the control of the licensed engineer, by faulty equipment or for any reason, the licensed engineer may be subject to both a civil and criminal penalty.

It must be emphasized that all American flag vessels are deliberately designed to discharge oil under normal operations. The construction and design of most American flag vessels has been approved by United States Government regulatory agencies and their design and operation makes some discharge of oil unavoidable even though the ship's licensed marine engineers and other officers will not even know that oil is being discharged.

All vessels use lube oil in their engines. Such lube oil is cooled by sea water passing around the tubes in which the oil is contained. The pressure of the oil is maintained at a higher level than that of the sea water so that if there is a leak in the tube, oil will be discharged into the ocean together with the sea water instead of the alternative of having sea water enter the engine. Moreover, on some vessels oil is carried in the double bottom and this oil can overflow when the ship goes from one water temperature to another.

These factors are inherent in the design of all ships. The result of S. 1067 could be that a ship operating in normal fashion, if its construction has been approved by the regulatory agencies, may spill oil without the knowledge of its licensed officers. Yet the result of such spillage could be that the licensed marine engineers would be subject to civil or criminal penalties and also to a possible loss of their license under Coast Guard procedures.

I think it critically important to point out to this Committee that marine engineers aboard oceangoing vessels are licensed by the United States Coast Guard and must be so licensed in order to serve in such a position. The Coast Guard has the authority to proceed against a licensed marine engineer and to take away or suspend his license for any conduct which is either contrary to Coast Guard regulations or which violates the licensed officer's obligations. In fact Section 7 of the Oil Pollution Act of 1961, 33 USC 1006, provides that the Coast Guard may suspend or revoke a license issued to a licensed officer who is found to have violated the provisions of the statute.

The continuation of the right to impose upon licensed marine engineers civil and criminal penalties under the statute subjects them to double jeopardy. They are subject to the increased penalties provided in S. 1067 and they are subject to the loss of their license by virtue of charges brought against them by the Coast Guard. Thus, it is possible that a licensed marine engineer may, through no fault of his own, but because of the discharge of oil or oily mixture, be subjected to civil and criminal penalties as well as to the loss of his license with the consequent loss of employment.

The license of a marine engineer is legally indispensable to his employment as such. The temporary or permanent revocation of that license prevents him from serving as a marine engineer. What appalls me is the very thought that the career of a licensed marine engineer, with an otherwise splendid background of accomplishment and achievement in the American Merchant Marine, could be destroyed because of the discharge of oil or oily mixture which resulted from no fault of his or from circumstances beyond his control.

In two recent pieces of legislation, the Congress of the United States, in an effort to control the pollution of navigable waters by the discharge of oil or hazardous substances has seen fit not to impose individual and personal liability upon licensed engineers or other officers. The Water Quality Improvement Act of

1970, Public Law 91-224, 33 U.S. 1161, states that an owner or operator of a vessel "from which oil is knowingly discharged" shall be assessed a civil penalty. Similarly the Water Pollution and Control Act Amendments of 1972, Public Law 92-500, 33 U.S. 1251 *et seq.*, provides a similar penalty only upon the "owner or operator" of a vessel and then only when the discharge is done "knowingly".

The important fact is that both of these recent statutes do not impose any civil or criminal penalty upon individuals for the prohibited discharge of oil. Although the Oil Pollution Act of 1961, which S. 1067 seeks to amend, imposes liability upon a person, MEBA submits that such liability should be confined to the shipowner and not to the licensed officer. And even if the licensed officer is at fault, he can properly be punished by the Coast Guard by virtue of its authority to impose upon him economic death through the loss of his license which will preclude him from any employment as a marine engineer.

There are countless situations in which a discharge of oil or oily mixture could occur without fault on the part of a licensed marine engineer. The primary cause of such a discharge could be faulty or inadequate equipment installed and continued in operation by the shipowner or operator. And in many instances, the malfunction of such equipment is latent and cannot be readily discovered by the responsible ship's personnel. Further, as I have pointed out, the discharge of oil or oily mixture simply cannot be avoided because vessels are deliberately designed and constructed, with the approval of governmental regulatory agencies, in a fashion which makes it impossible to prevent some leakage or spillage of oil. To impose statutory penalties, both criminal and civil, upon individuals for such a possibility, together with the double jeopardy in which they are placed by the risk of a loss of a Coast Guard license, is unfair, inequitable and unjust.

It is the position of MEBA that the remedies available to the United States Coast Guard in imposing a possible loss of license upon a marine engineer are more than sufficient. The civil and criminal penalties of the Oil Pollution Act of 1961 and of S. 1067 should not be applied to or imposed upon such individuals. The possible penalties upon licensed marine engineers in my opinion constitutes the kind of cruel and unusual punishment which is abhorrent to our society. The ultimate sufferers of such harsh civil and criminal penalties are the wives and children of those marine engineers whose very economic existence depends upon the ability of the head of the family to earn a living and support his wife and children.

We request that such provisions be deleted from S. 1067 and from the Oil Pollution Act of 1961.

STATEMENT OF CARMEN F. GUARINO, COMMISSIONER, PHILADELPHIA WATER
DEPARTMENT

My name is Carmen F. Guarino, and I am commissioner of the city of Philadelphia Water Department. My statement concerns the city's current practice of controlled disposal of digested sewage sludge in the Atlantic Ocean.

When Philadelphia was disposing digested sludge on the continental shelf at a site 13.8 nautical miles due east of Cape Henlopen, Delaware, newspaper articles had frequently mentioned that Philadelphia's practice of ocean disposal was to the detriment of the marine environment and had created a "dead sea". My statement will show that this is not the case, but was rather a reaction based upon misinformation or hypotheses without factual data.

In general, there is the misconception that digested sludge contains debris, such as orange crates and milk cartons, and is the cause of oil slicks and tar-like deposits on the beaches of our country. This is simply not true.

The city's digested sludge, for example, is not like raw sludge or industrial waste. Our municipal sludge has been treated by an anaerobic and aerobic process over a minimum of 25 days and the organic material has been metabolized and converted into relatively stable, innocuous residues combined with water. With this in mind, the impact of digested municipal sludge can be considered in the ocean's ecology.

For a period of twelve years, the city had barged approximately 2,000,000 gallons of digested sludge, about every five days, to the ocean site east of Cape Henlopen. This sludge was 90% purely water, about 5% inert material, such as, sand and dirt, and about 5% stabilized organic matter. In effect, each barge load contained about 100,000 gallons of organic nutrients beneficial to the oceans ecology.

The disposal site was some 12,000 feet long by 6,000 feet wide with an average depth of 60 feet. The continuous movement of ocean waters in this area provided a complete water exchange every five hours or almost five times per day, resulting in a tremendous dilution factor. This dilution was equivalent to one gallon of organic material in every 1.5 million gallons of sea water.

It took approximately six hours for our sludge solids to be dispersed, stabilized and settled to the bottom of the area. At the end of this period the normally prevailing saturated dissolved oxygen conditions were reestablished throughout the site.

It should now be noted Camden, N.J., also used this same site for sewage sludge disposal.

We can demonstrate that in the twelve years both Philadelphia and Camden had used this site on the continental shelf no discernable deterioration of the area or aquatic life had occurred. The point here is that the ocean's assumulative capacity and dilution factors for wastes of this type cannot and should not be discounted.

At the very inception of the sludge disposal project, Philadelphia was concerned about any possible deleterious effects of its actions on the ocean environment. And this was certainly well in advance of any national or world attitude on the subject or federal obligation to do so. Philadelphia surveyed and in consultation with others deliberately selected an economically unproductive shell fish area for the disposal site. Records were kept and surveillance maintained over disposal operations. The city by its own initiative and entire expense, engaged the Franklin Institute Research Laboratories to make an investigation of the ecological conditions at the disposal site. This independent study undertaken by the Franklin Institute Research Laboratories included the efforts of the Thomas Jefferson Medical College and the marine science consortium indicates that there was no degradation of the ocean environment within and around our former disposal location.

The conclusions of the Franklin Institute study were:

1. The heavy metal concentrations within a six nautical mile radius of our disposal area are the same as those up to 12 nautical miles outside of the disposal area.
2. Metal concentrations in clam meats inside the disposal area are the same as clams outside the disposal area.
3. The coliform counts within the disposal area, when found at all, were well within U.S. public health service standards for drinking water.
4. The marine life within the disposal area is numerous, diversified in species and healthy.

Despite the findings of the Franklin Institute report which showed the Philadelphia practice to be harmless for 12 year background levels and therefore environmentally acceptable and sound, EPA told Philadelphia to abandon the site and issued the city an interim permit to continue our sludge disposal activities at a new site some 50 miles southeast of Cape Henlopen, Delaware.

The new site poses some problems if conditions imposed by the Ocean Dumping bill are to be evaluated properly. The water is twice as deep, there is no background information, and the area was being used for the dumping of wastes from a chemical plant. There is a temperature gradient and therefore at certain times of the year, the thermocline may materially affect disposal and testing conditions.

EPA has made a hurried study of the vicinity prior to our initiation of using the site. Philadelphia is cooperating in the overall monitoring and evaluation work by providing surveillance, all types of bio-chemical testing and record keeping for EPA. This kind of involvement is advocated and should be fostered to a greater extent by the Government. Had EPA been involved in the work of the Franklin Institute, at our former disposal site, perhaps that study would have received wider acceptance. As it now stands our disposal costs have increased by 50% by virtue of transportation to the new site and the environmental acceptance of our disposal practice at this new location remains to be seen.

It has been suggested to dispose of digested sewage sludge off the Continental Shelf. This alternative would appear less desirable at this time due to the lack of information and time to make a proper assessment. The water off the Continental Shelf is a minimum of $\frac{1}{2}$ mile deep, extremely cold with limited light penetration, and as such, biological and aquatic activity is arrested to a minimum. Sewage sludge material in this case will not be readily assimilated into the ocean environment and recycled. The recycling of our natural resources is of

national concern and must be fostered if we are not to deplete our resources through waste. Digested sewage sludge dumped off the Continental Shelf will not be assimilated resulting in a net loss to the total environment.

On the other hand, the Continental Shelf is conducive to nature's recycling process. Oceanologists agree that the Continental Shelf is a highly productive region of the ocean and its productivity is limited only by the availability of nutrients. Considering this fact, when digested sludge is applied to the ocean, the constituents become beneficial nutrients that enrich the marine ecosystem and enhance aquatic productivity.

Attention is now called to the "Marine Protection Research and Sanctuaries Act of 1972" (PL-92-532) and the EPA interim regulations which would implement the act.

Section 2(b) of the act requires that all types of material being dumped into ocean waters should be done so as to "prevent or strictly limit the dumping into ocean waters of any material which would adversely affect human health, welfare, or amenities to the marine environment, ecological systems, or economic potentialities . . ." In my opinion, the regulations should be addressed to this purpose and should not extend the meaning of the act. The act also lists, in section 102(a) considerations by which the administrator shall evaluate permit applications. The criteria produced with the interim regulations, however, extend the meaning of the act and replace the considerations of section 102(a) with a set of limitations that fail to consider several major scientific and practical aspects. If applied generally, they will act to prohibit rather than regulate the use of the ocean as a natural resource. They would also prohibit any beneficial aspects from occurring to the ocean environment. For example:

Section 227.71 of the criteria require toxicity to be established by a 96 hour bioassay, and in turn, this result would be divided by 100 (in other words, a safety factor of 100) to reach what is considered a permissible level. The Federal Water Pollution Control Administration in its publication entitled "Water Quality Criteria", recommended that the toxicity of metals should be determined using a 96 hour bioassay and then tentatively suggested that an application factor of .01 be applied for pesticides and metals. This 5 year old suggestion is recognized by the technical community to be a tentative and arbitrary recommendation in the absence of suitable scientific information. In the publications: "Water Quality Criteria" by McKee and Wolf and the "Water Quality Criteria Data Book—Volume 3" by the Environmental Protection Agency, no mention is made to utilizing a 96 hour bioassay technique on aquatic species indigenous to the marine environment. Therefore, in the absence of comparative data, each applicant would of necessity have to provide the needed data by virtue of self funded research activities. This results in a waste of manpower and other resources through uncoordinated, duplication of effort.

I submit that this is not intent of the act because it provides that the administrator shall . . . "initiate a comprehensive and continuing program of monitoring and research regarding the effects of the dumping of material into ocean waters . . ." Overly strict and arbitrary criteria are not a suitable substitute for a continuing program of monitoring and research. The administrators should be enabled therefore to issue permits on a case by case basis, using considerations outlined in the act, until monitoring and research activities provide the basis for reasonable criteria. Where existing scientific studies and data are available, these should be used in lieu of arbitrary criteria.

I must speak about heavy metals because much of the proposed regulations and criteria address this subject. Keeping in mind the intent of the act is to protect the human health, it would be well to realize that the majority of metals found in sewage sludge do not emanate from industry, but are contained rather in domestic sanitary wastes. Patent medicines and health aids, which can be purchased without prescription and are approved by FDA for sale to the public, contain significant concentrations of heavy metals and these eventually pass through the human body or are washed off and end up in sewage sludge.

Considering all circumstances, it is difficult to see why concentrations of certain heavy metals determined by the 96 hour bioassay procedure to be non-toxic to indigenous marine organisms should be further restricted by additional arbitrary criteria. The requirement that concentrations of mercury and cadmium cannot be greater than one order of magnitude above the background concentration in sea water is one of these. No mention or considerations are made for complexing or bound metals. Using the latter criteria, the Delaware river should not be allowed to empty into the ocean.

The act provides that the administrator of EPA shall determine which dumping will not unreasonably degrade the ocean environment. However, the regulations are so specific that the prerogatives of the administrators to accept and utilize available scientific information in their determination of what is permissible dumping, is negated, particularly if such scientific evidence would tend to justify ocean disposal.

If the intent of the regulations is to eliminate the dumping of wastes, and in particular sludge generated by sewage treatment, in the ocean it may be well to consider the potential impacts of the alternatives. For example, is the total environment improved by eliminating the dumping of sludge at sea and placing the same sludge on land? The large scale land application of digested sewage sludge, particularly in the humid urban northeast corridor, must be examined closely to determine its feasibility. Lack of information regarding such disposal activities on land would seem to preclude this alternate as an immediate substitution for ocean disposal. While land application of sludge is currently being practiced by Chicago, there is indeed no assurance of the transferability of the results or of the methodology employed. This is evidenced by the fact that the city of Philadelphia and the U.S. EPA are currently negotiating a research facility demonstration grant for this purpose.

In order to properly manage and optimize the use of our total natural resources, any legislation and implementing regulations must consider the entire environment, including a myriad of socio-economic needs such as:

1. "What is the total environmental impact of the many alternates as compared to ocean use, including activities?"

2. "Will other disposal methods intensify the energy crisis?"

3. "Will public opinion prefer other disposal techniques to ocean dumping?"

Questions of this nature must be effectively answered before regulations and criteria are produced that might unnecessarily eliminate the use of the ocean as a vehicle for recycling our natural resources.

Along these lines, implementing national policy should not cause a burden or hardship to certain segments of country by precluding an acceptable waste disposal method. In the highly urbanized northeast, for example, the cost of alternate means of disposal for certain wastes will be significantly higher than ocean dumping. Federal subsidies may be required in such areas to offset these costs which are incurred as a function of geography. Increased costs for waste disposal in urban areas must also be considered in the context of higher priority human needs such as schools, crime prevention, better housing, etc.

Philadelphia now produces nearly 380,000 gallon of digested sludge a day. We cannot shut down our three plants which treat over 450 million gallons of sewage per day not only from Philadelphia, but from surrounding communities. These plants are being rebuilt at a cost of \$247 million in compliance with EPA regulations. When complete, the new plants will generate twice the present volume of digested sludge and intensify the problem.

In the design of these new facilities, we had to necessarily reassess our methods of sludge disposal. The environmental feasibility of any method was an important factor as well as related capital and operating costs. In our opinion, disposal of digested sludge at sea is an environmentally acceptable method with the least effect on our total environment. Operating costs for ocean disposal are approximately \$10 per dry ton. If figures for Chicago's land disposal method are applicable to the Philadelphia metropolitan area, then operating costs for this method are as high as \$70 a dry ton and it would appear that the Philadelphia area would experience particular problems for transportation which could add significantly to the estimated cost for land disposal.

Incineration is expensive method with projected costs running as high as \$80 a dry ton. With incineration, one must also consider air pollution aspects and additional capital and operating costs.

It has been estimated at start up of Philadelphia's new updated plans using present day prices that additional costs for ocean disposal will be about \$1 more per account or 2.7% of today's charge for sewerage services; land disposal will increase the sewer bill by 40% (\$15.00), and incineration 47% (\$17.40). These numbers will have to be increased to reflect inflation which is currently estimated to be 8% per year for contractual services.

Prudently, we must consider costs and in so doing we conclude that on the basis of available scientific information, there is no cause to foreclose use of the ocean for disposal of digested sewage sludge and consequently increased costs which in Philadelphia's case would be 5-8 times their present level.

In summary, we urge the following action be taken and we stand ready to cooperate fully to implement these recommendations.

1. Begin immediately to further assess the effects of ocean disposal on the marine environment undertaking the needed research activities mandated in the "Marine Protection Research and Sanctuaries Act."

2. Begin immediately to assess the environmental effects of alternatives to ocean disposal for a large scale operation such as Philadelphia, such alternatives would include land disposal and/or incineration. In fact, the act requires the administrators to consider "appropriate locations and method of disposal or recycling, including land-based alternatives and the probable impact of requiring use of such alternate locations or methods upon considering affecting the public interest."

Matter can neither be created nor destroyed. The disposal of sewage sludge must recognize this premise, and consideration must be given to the total environmental effects, including a priority approach which includes human needs, before a decision can be made. Do not foreclose the use of the ocean for purposes to which it is well suited.

STATEMENT OF JAMES G. WENZEL, VICE PRESIDENT—OCEAN SYSTEMS,
LOCKHEED MISSILES & SPACE CO.

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to describe a recent survey of Deep Water Dump Sites off Southern California. During June 1972, three dives utilizing the Lockheed research submersible DEEP QUEST were conducted to directly observe the environmental effects of some 25-30 years of waste disposal.

The study was undertaken by the Plessey Environmental Systems Co., San Diego, Calif., for the National Oceanic and Atmospheric Administration (NOAA), Manned Undersea Science and Technology Office, under Contract No. 2-34535. Lockheed Ocean Laboratory scientists participated in the dives and supported Plessey's efforts by subsequent analysis of sediment samples collected by DEEP QUEST. The areas investigated included a radioactive dump site in the Santa Cruz Basin, an industrial chemical dumping site in the San Pedro Basin, and a garbage and trash disposal site off Santa Catalina Island. These dives represent the first such attempt to observe the effects of various types of wastes that have been disposed of in the Pacific Ocean over the last 25 years.

The dives were made utilizing DEEP QUEST and its support ship TRANS-QUEST. DEEP QUEST, a 50-ton, 40-foot long submersible, is owned by Lockheed Missiles & Space Co., Inc., Sunnyvale, California, and is operated by the Lockheed Ocean Laboratory in San Diego. For the purpose of the ocean dump-site investigation, DEEP QUEST was equipped with a 6-barrel piston corer for obtaining bottom samples, a Plessey Salinity/Temperature/Depth profiling system, a Rosette Multi-Sampler supplied by General Oceanics, Inc., and Lockheed's vane shear strength probe. Both 70mm and 35mm cameras were utilized to provide photographic documentation of the dives.

The Santa Cruz Basin disposal area had been used as a site for low-level containerized radioactive waste disposal from 1953 until 1961. During the 9-hour dive to 1915 meters, ten 55 gallon drums were located along with a number of ammunition pieces and metal pallets, some with munitions still strapped on. Although the investigation was primarily of a reconnaissance nature, the abundant and active marine life and bottom characteristics observed and photographed aboard the DEEP QUEST in the disposal area were what had been expected on the basis of the results of a shipboard environmental survey conducted by the AEC in 1960. The loss of biological samples upon surfacing in heavy seas and the malfunctioning of the water sampling bottles precluded any radiometric analyses. However, in terms of future investigations of this disposal site, perhaps one of the most significant aspects of the dive was the positive identification of pair of radioactive disposal drums which are known to be part of an experimental operation involving the dumping of 164 drums and concrete boxes by the AEC in 1961. Those barrels will serve as an excellent reference point in locating the rest of the containers for the purpose of conducting more detailed studies of the disposal site at a later date to assist in formulating U.S. National and International policy regarding ocean disposal of low-level radioactive wastes.

A chemical and industrial waste disposal site in the San Pedro Basin was the location for the second dive to 890 meters. Here a variety of toxic industrial chemicals prohibited from disposal in municipal sewers, are dumped regularly.

Also, some 3 million tons of drilling muds and well cuttings were discharged in the area from 1966 to 1970. With the exception of tiny snails and a few deep sea sponges, there was almost complete absence of normal marine bottom life in the area covered by DEEP QUEST during this inspection dive. Numerous dead fish, shrimp and jellyfish were observed in various stages of decomposition. The absence of the usual forms of bottom life in the San Pedro Basin was to be expected because of the known lack of oxygen along the bottom. This is a natural phenomenon related to the coincident depth of the basin sill and the oxygen maximum layer present in the Northeastern Pacific Ocean. The organisms observed on the Basin's floor apparently either died in the upper layer of the water column or strayed to their death in the anoxic bottom layer. Evidence of recent disposal activities in the designated dump site was scant.

Cans, barrels, and expended Naval ordnance encountered during the dive all appeared to be quite old and showed evidence of long-term deterioration. The apparent lack of anticipated concentration of wastes in the official dumping area could be the result of the disposal operations not being conducted according to established regulations or simply because of the differences between the navigational methods used to locate the dumping grounds by the disposal operator and the TRANSQUEST.

The final inspection dive to a depth of 798 meters was conducted in a disposal area designated for vessel refuse and garbage collected from ships in Los Angeles and Long Beach Harbors. Approximately 250 tons a year of these wastes are reportedly dumped in a four kilometer circle 14 kilometers southeast of Santa Catalina Island. The environment here was a normal, active and thriving bottom community characterized by an abundance of medium sized fish, star fish, and worms. DEEP QUEST ran 10.4 kilometers through the area towards Long Beach along the designated route of the dumping vessel observing a limited amount of trash such as cans, bottles, and paper. The lack of wastes observed on the dive may be due to the fact that the prevailing southeasterly currents carry most of the refuse out of the area, or as postulated for the San Pedro Basin disposal site, it is possible that dumping may not always be conducted in the correct area. No further investigations of this dump site were recommended.

Further details of this series of dives may be obtained from a summary report submitted by the Plessey Co. to NOAA in April 1973, which is entitled "Submersible Inspection of Deep Ocean Waste Disposal Sites off Southern California" by Robert P. Brown and Edward H. Shenton, Plessey Environmental Systems, San Diego, California. A copy of this report has been provided to the Subcommittee staff.

STATEMENT OF BETHLEHEM STEEL CORP., SHIPBUILDING DIVISION

The Subcommittee's hearings are directed to the general subject of marine pollution as well as to a number of specific measures which are concerned with this very important subject. Among the specific items mentioned in the releases and letters which preceded these hearings were S. 1067, which would implement the 1969 and 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, and the final draft text of the 1973 IMCO Convention on Prevention of Pollution From Ships.

Although both S. 1067 and the 1973 IMCO Convention are unquestionably important in any discussion of the marine pollution problem, at least two other proceedings currently in progress are also relevant to that problem and particularly to that portion of the problem which is caused by operational and accidental discharges from ships.

The first of these proceedings involves the final environmental impact statement recently published by the U.S. Maritime Administration covering its tanker construction program. That statement and the various alternatives discussed in it are now being considered by Administrator of the Maritime Administration.

The second proceeding involves a rule making proceeding initiated by the Coast Guard. Acting under the authority contained in the Ports and Waterways Safety Act of 1972, the Coast Guard released for comment on January 26, 1973, an "Advance Notice of Proposed Rule Making" (38 F.R. 2467, January 26, 1973). That notice indicated that the Coast Guard was considering a proposed rule that would require all tankers delivered after January 1, 1967 to be constructed with a double bottom and with segregated ballast capacity not less than 45 percent of full load displacement.

Over the years the Shipbuilding Division of Bethlehem Steel has constructed over 3,000 ships of nearly every type and description. We currently operate 8 shipyards although most of our new construction is concentrated at our shipyard at Sparrows Point, Maryland. It is in this yard which has been engaged continuously in shipbuilding since the turn of the century that we are now constructing 265,000 DWT tankers, the largest tankers that have ever been constructed in this country.

Since Bethlehem's principal expertise relates to the design and construction of ships, including very large crude carriers (VLCC's), the majority of our comments will be addressed to the Maritime Administration's action, the Coast Guard's proposal, and to the draft IMCO convention's provisions pertaining to segregated ballast standards.

Bethlehem shares the view expressed by the Congress in enacting the Ports and Waterways Safety Act of 1972 that additional efforts must be made to reduce pollution of the world's oceans. At the same time we recognize that the strengthening of existing standards and regulations relating to the construction and operation of ships can contribute significantly to the abatement of marine pollution.

The task of developing meaningful, effective standards which will contribute to the abatement of marine pollution is not an easy one. Before any intelligent determinations can be made, a number of complex questions must be addressed. Are the standards established by international convention adequate to deal with the problem or is there a need for supplemental domestic legislation or regulation? If supplemental laws or regulations are considered necessary for protection of U.S. waters how can such laws or regulations be effectively enforced in view of the fact that more than 95 percent of U.S. oil imports arrive at United States shores in foreign-flag vessels? Should the primary thrust of standard setting be directed to traffic control and other systems which seek to minimize the number of accidents or should the focus be on design features which might minimize oil outflow in the event that an accident does occur?

As a result of our experience, we have reached a number of conclusions which are relevant to any discussion of standards aimed at abating marine pollution. They are as follows:

- (1) In view of the large number of approaches, systems, equipment, and design alternatives available, it is essential that any conclusions reached as to the relative merits of possible alternatives be based on careful consideration of adequate amounts of data and that resources be directed to those solutions which are likely to prove most cost-effective.

- (2) It generally makes more sense to focus on methods of preventing marine accidents in the first place rather than to focus on methods by which pollution can be minimized in the event that an accident does occur.

- (3) Whatever the nature of standards considered to be necessary, it is infinitely preferable to have such standards established by international agreement rather than by unilateral action.

- (4) To the extent that supplemental standards in the area of vessel design are considered necessary for the protection of U.S. waters, they must be imposed in such a way that they will be generally applicable to and enforceable against foreign as well as U.S. flag vessels.

THE NEED TO DEVELOP ADDITIONAL DATA

The Maritime Administration's recent environmental impact statement required 100 pages to discuss various alternatives relevant to marine pollution. Although that statement attempts to address design alternatives in terms of their relative cost-effectiveness, the statement recognizes in a number of different places that meaningful cost-effectiveness comparisons are hindered by serious weaknesses in the data base.

The significance of this fundamental inadequacy represents a major obstacle to be overcome if national standards are to be established. Its importance is illustrated by the Coast Guard's proposed rule which would require that all new tankers be constructed with double bottoms.

In developing its proposed rule, the Coast Guard placed very heavy reliance on the projected effectiveness of that particular design feature as described in a report entitled "Report on Study I—Segregated Ballast Tankers" (Study I), a note submitted by the United States to IMCO in 1972. Because of the significance which has been attached to Study I, we asked Booz-Allen Applied Research,

a consulting firm with considerable experience in matters relating to marine transportation, to review that report. After a comprehensive analysis of Study I and related materials, Booz-Allen found that Study I was based to a very large extent on assumptions and calculations which were unsupported and unreasonable. The Booz-Allen analysis concluded:

(i) That insufficient data exists to permit a reasonably accurate projection of the outflow reduction which might result from the incorporation of double bottoms in VLCC's, and

(ii) The assumptions and calculations utilized in Study I tend to unreasonably inflate the magnitude of the outflow reduction which might be expected to be derived from the incorporation of double bottoms in VLCC's.

A copy of Booz-Allen's comprehensive report is attached to this statement as Attachment A.¹

The data base inadequacies which are detailed by Booz-Allen in its report, suggest to us that data collection efforts should be regarded as a matter of high priority by concerned government agencies. The collection of such data is, in our judgment, a necessary prerequisite to a national exercise of discretion in the standard setting area. Until such data are collected and analyzed it is virtually impossible to determine with any reasonable degree of accuracy the relative merits of various alternatives which might contribute to the reduction of marine pollution.

THE NEED TO ESTABLISH STANDARDS WHICH WILL MINIMIZE ACCIDENTS

To the extent that resource limitations necessitate choices between standards directed to accident avoidance and standards directed to minimizing oil outflow in the event of an accident, we believe that emphasis should be placed on efforts to reduce the number of accidents involving oil carrying vessels. Several considerations point to this conclusion.

First, to the extent that an accident can be avoided there is assurance that accidental outflows will not result. A particular design feature may or may not prevent oil outflow in the event of an accident. As Bethlehem recently observed in commenting on the Coast Guard's proposed double bottom requirement before the Coast Guard Subcommittee of the House Committee on Merchant Marine and Fisheries, a double bottom may, in certain circumstances, actually increase rather than decrease the risk of marine pollution resulting from a grounding. In a particularly serious grounding, for example, the flooding of the empty ballast tanks of a vessel with a double bottom will increase the vessel's draft which, in turn, may make refloating difficult or impossible without the major removal of cargo. In deteriorating weather conditions the result could be the total loss of the vessel and a massive oil spill.

The possibility that a double bottom requirement might actually increase the risk of pollution in particular cases was only one of the reasons why Bethlehem submitted adverse comments on the proposed rule to the Coast Guard and felt compelled to testify against the proposed rule at the hearings which were recently held by the Coast Guard Subcommittee. Rather than reiterating all of the points which influenced Bethlehem's position on the proposed rule, we are including as Attachment B² a copy of the written comments which Bethlehem submitted to the Coast Guard on March 15, 1973. We are also including as Attachment C³ a copy of the testimony which was presented on Bethlehem's behalf before the Coast Guard Subcommittee on June 7, 1973.

Second, because the costs involved in retrofitting existing vessels with double bottoms or other major design features would be prohibitive in many instances, it might not be possible to apply such standards to hundreds of older foreign-flag vessels. On the other hand, improved traffic control systems in harbor areas and other congested waters would yield immediate benefits irrespective of the age or nationality of the vessels entering such waters. While equipment additions may be necessary to enable some older vessels to obtain the full benefits of improved traffic control systems, such additions would be much less expensive and could be effected much more rapidly than modifications in the vessel's basic design.

Third, experience has confirmed that the installation of traffic control systems will significantly reduce the number of accidents which might otherwise be expected to occur. Statistics contained in the Maritime Administration's final

¹ The attachment is in the committee files.

^{2 3} The attachments are in the committee files.

environmental statement indicate that the adjoining ports of Los Angeles and Long Beach, using a combination of "traditional" traffic control practices and modern surveillance and communications procedures, have handled some 91,000 vessel movements since 1949 without loss of life, personal injury, pollution of harbor waters or collision between merchant ships. Similarly, the installation of a traffic control system in the Port of Rotterdam had dramatic results. Installation of the system resulted in a 75 percent decrease in the accident rate even though there was a 75 percent increase in traffic volume during the period studied.

THE NEED TO SEEK INTERNATIONAL AGREEMENT ON STANDARDS

In its report on the Ports and Waterways Safety Act of 1972, the Senate Commerce Committee concluded that:

The Committee fully concurs that multilateral action with respect to comprehensive standards for the design, construction, maintenance and operation of tankers for the protection of the marine environment would be far preferable to the unilateral imposition of standards.

We are in full agreement with the Committee's conclusion.

Marine pollution is clearly a problem of international concern and every effort should be made to find a solution to that problem by means of international agreement. There are a number of reasons why it is in the long run interest of the United States to lend maximum support to international initiatives to common environmental problems. The Chairman of the President's Council on Environmental Quality, Russell Train, listed four of these reasons earlier this year in testimony before the Senate Foreign Relations Committee.

(1) Such agreements can help to prevent pollution of areas outside our jurisdiction which would have long-run adverse effects on our national environment;

(2) Failure to support international agreements concerning pollution problems can bring the United States into conflicts—political and economic—with other nations, including our immediate neighbors, which it is in our interest to avoid;

(3) The international competitive standing of United States industry is, as the Congress recognized last year in section 7 of the Federal Water Pollution Control Act, enhanced by international acceptance of pollution safeguards . . . ; and

(4) By supporting international agreements on the environment we will create an international climate in which we are better able to obtain support from other nations in areas of international concern which are related to environmental protection.

For these reasons we believe that it is essential that the interested governmental regulatory agencies—the Coast Guard and the Maritime Administration—defer any standard setting action until after the conclusion of the 1973 International Conference on Marine Pollution. The Coast Guard has already announced that it will suspend further rule making procedures until after the Conference and we are hopeful that the Maritime Administration will reach the same conclusion.

While on the subject of the 1973 International Conference, a few comments on the draft text of the convention which has been prepared for discussion at the conference may be helpful. One of the significant provisions in the draft text is the proposed requirement for segregated ballast tanks of sufficient capacity to permit vessels to operate safely on ballast voyages under weather and sea conditions they might normally be expected to encounter. It is our understanding that the United States favored a more stringent double bottom/45 percent segregated ballast requirement which was essentially identical to the requirement contained in the Coast Guard's advance notice of proposed rule making.

In our view, the requirement contained in the draft text of the convention is a reasonable one which would yield significant environmental benefits if it were adopted. It would, in our judgment, effectively deal with pollution resulting from normal tanker operations, including the ballasting and cleaning of cargo tanks. Operational discharges of this type account for approximately 70 percent of the pollution attributable to tankers and tank barges. In our judgment the additional benefits which a double bottom requirement might be expected to yield are speculative at best and clearly not worth the additional cost.

With regard to cost, we have estimated that a 265,000 DWT vessel equipped with a double bottom and with segregated ballast capacity equal to 45 percent of full load displacement would cost 11.2 percent more than a similar vessel with the same segregated ballast capacity but without a double bottom.

Cost estimates currently being used by both the Coast Guard and the Maritime Administration for double bottomed and segregated ballast vessels are considerably lower than corresponding estimates which have been developed by Bethlehem and other shipbuilders. We believe that the estimates being used by the government agencies are considerably understated and we are including as Attachment D⁴ a cost analysis which identifies the significant differences between the hypothetical vessels which have been used to develop the government's cost estimates and Bethlehem's 265,000 DWT vessels.

THE NEED TO ENSURE THAT STANDARDS ARE ENFORCEABLE AGAINST
FOREIGN-FLAG VESSELS

If the 1973 IMCO Conference requires segregated ballast that will permit vessels to operate safely on ballast voyages under weather and sea conditions normally encountered, there should be no need for United States regulatory agencies to impose unilaterally additional design standards. To the extent that additional measures are considered necessary for the protection of U.S. waters, we recommend that those measures be directed to the establishment of improved traffic control systems.

If the 1973 IMCO Conference should fail to produce a convention which adequately deals with the marine pollution problem, it may be necessary for the United States to consider taking some form of unilateral action. In that event, the Congress and the regulatory agencies should proceed cautiously and with the knowledge that the unilateral imposition of design standards could have potentially disastrous consequences for the U.S. Merchant Marine and the American shipbuilding industry.

Regulatory action by the Maritime Administration under its tanker construction program would not be effective because the Maritime Administration has no authority to reach foreign-flag vessels entering U.S. waters. Imposition of any significant design requirement by the Maritime Administration would, in the absence of a parallel Coast Guard requirement which could effectively reach foreign-flag vessels, make it impossible for U.S. shipyards to compete with foreign shipyards for vessel orders. Ship owners would, for economic reasons, simply elect to have their vessels constructed in foreign shipyards where anti-pollution design features would not be required.

The likelihood of this result has been confirmed by our own recent experience. Over the past several months Bethlehem has negotiated agreements with two purchasers for the construction of 265,000 DWT vessels. Each agreement covers two vessels. Each vessel will cost in excess of \$72 million. Both of these agreements are contingent upon the receipt of necessary subsidies under the Maritime Administration's tanker subsidy program. What is of particular concern to Bethlehem, is that both purchasers insisted on clauses that would permit them to terminate their agreement with Bethlehem if the Maritime Administration should require the addition of anti-pollution design features not required by international agreement.

Even if the Coast Guard were to attempt to promulgate regulations that no vessel could enter U.S. waters unless it met certain design standards, there is no assurance that such regulations would compel ship owners to have vessels constructed to those standards. This is particularly true in the case of VLCC's. Since there are no deep water ports located in U.S. waters capable of accommodating VLCC's, such vessels need not enter U.S. waters and their owners would feel little compulsion to have vessels constructed to such standards.

Thus, any unilateral standard setting could make it impossible for U.S. shipyards to compete effectively with yards in foreign countries. Should that occur, the consequences to the nation would be serious. Bethlehem and other ship builders would have to convert multi-million dollar tanker construction facilities to other purposes, the important economic and national defense goals established by the Merchant Marine Act of 1970 would be frustrated, the U.S. balance of payments position would be adversely affected, shipyard unemployment would undoubtedly increase, and the nation would be almost totally dependent on foreign-flag tankers for essential energy resources. Ironically, risks to the environment would also increase. In the absence of U.S. flag vessels, virtually all oil imports would be carried in foreign-flag tankers which are more likely to be involved in accidents resulting in pollution. In this regard the Mari-

⁴ The attachment is in the committee files.

time Administration's Impact Statement concluded that: "It appears likely that the substitution of foreign-flag tankers for newly constructed U.S. owned, operated and regulated vessels would involve increased risks of ship generated pollution. . . ."

Bethlehem Steel appreciates the opportunity to present this statement and we are hopeful that the information and data which we have been able to provide will be of assistance to the Committee.

CONVENTION OF THE PREVENTION OF MARINE POLLUTION BY
DUMPING OF WASTES AND OTHER MATTER

DONE AT LONDON, MEXICO CITY, MOSCOW, AND WASHINGTON, DECEMBER 29, 1972

Country—Date and place of signature, date and place of ratification :

Argentina, May 15, 1973—W.
Bolivia, December 29, 1972—MC.
Byelorussian S.S.R., December 29, 1972—M.
Canada, December 29, 1972—MC. February 9, 1973—W, M, L.
Chad, December 29, 1972—W.
China, Republic of, December 29, 1972—W.
Colombia, December 29, 1972—MC.
Costa Rica, December 29, 1972—MC.
Denmark, December 29, 1972—L, MC, M, W.
Dominican Republic, January 18, 1973—MC.
Finland, December 29, 1972—L, MC, M, W.
France, May 22, 1973—W.
Germany, Federal Republic of, January 22, 1973—L¹, January 26, 1973—W¹,
January 23, 1973—M¹.
Guatemala, January 30, 1973—MC.
Haiti, December 29, 1972—MC.
Honduras, December 29, 1972—MC.
Iceland, December 29, 1972—L.
Italy, December 29, 1972—L¹, MC¹, M¹, W¹.
Japan, June 22, 1973.
Jordan, January 4, 1973—W. Apr. 5, 1973—M.
Khmer Republic, January 2, 1973—L.
Kuwait, March 8, 1973—W. March 1, 1973—L.
Lebanon, December 29, 1972—W.
Lesotho, January 8, 1973—W.
Liberia, December 29, 1972—W. January 1, 1973—L.
Luxembourg, December 29, 1972—L¹.
Mexico, December 29, 1972—L, MC, M, W.
Morocco, June 22, 1973.
Nepal, December 29, 1972—M. January 1, 1973—L.
Netherlands, April 12, 1973—W, L.
New Zealand, May 30, 1973—W.
Norway, December 29, 1972—L, MC, M, W.
Panama, December 29, 1972—W.
Philippines, December 29, 1972—L.
Portugal, December 29, 1972—L, MC, W.
Senegal, December 29, 1972—W.
Somalia, Apr. 16, 1973—M.
Spain, April 27, 1973—L.
Sweden, December 29, 1972—L, MC, M, W.
Tunisia, March 5, 1973—W.
Ukrainian S.S.R., December 29, 1972—M.
U.S.S.R., December 29, 1972—L, MC, M, W.
United Kingdom, December 29, 1972—L¹, MC¹, M¹, W¹.
United States, December 29, 1972—L, MC, M, W.
Uruguay, December 29, 1972—MC.

Total as of June 22, 1973 : 45.

NOTE.—L—London ; MC—Mexico City ; M—Moscow ; and W—Washington.

¹ With statement(s).

INTER-GOVERNMENTAL MARITIME CONSULTATIVE ORGANIZATION,
MARCH 7, 1973

PREPARATORY MEETING FOR THE INTERNATIONAL CONFERENCE ON MARINE
POLLUTION, 1973—FEBRUARY 12—MARCH 2, 1973—AGENDA ITEM 8

REPORT OF THE PREPARATORY MEETING TO THE MARITIME SAFETY COMMITTEE

Attached hereto is the Final Draft text of an International Convention for the Prevention of Pollution from Ships, 1973, prepared by the Preparatory Meeting.

Subject to approval by the Maritime Safety Committee, this Draft will be issued as a working document under Agenda item 6 of the Conference.

DRAFT TEXT OF AN INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION
FROM SHIPS, 1973¹

The contracting States,

Being conscious of the need to preserve the human environment in general and the marine environment in particular.

Recognizing that deliberate, negligent or accidental release of oil and other harmful substances from ships constitutes a serious source of pollution,²

Desiring to achieve the complete elimination of international pollution by oil and other harmful substances and the minimization of accidental discharge of such substances,

Considering that this end may best be achieved by the conclusion of a comprehensive convention not limited to oil pollution to supersede³ the International Convention for Prevention of Pollution of the Sea by Oil, 1954, as amended as between Parties thereto,

Have agreed as follows:

ARTICLE 1.—GENERAL OBLIGATION UNDER THE CONVENTION

(1) The Contracting States undertake to give effect to the provisions of the present Convention and those Annexes thereto by which they are bound in accordance with the provisions of Articles 13 and 17 of the present Convention.

(2) Unless expressly provided otherwise, a reference to the present Convention constitutes at the same time a reference to the Annexes.

ARTICLE 2.—DEFINITIONS

For the purpose of the present Convention, unless expressly provided otherwise:

(1) "Regulations" means the Regulations annexed to the present Convention.

(2) "Administration" means the Government of the State whose flag the ship is entitled to fly or under whose [authority]⁴ the ship is operating in accordance with Article 3(1)(b).

(3) "Harmful substance" means any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, including any substance subject to control by any Annex to the present Convention.

¹ One delegation was of the opinion that two new Conventions should be formulated, one dealing with oil pollution and the other dealing with pollution by noxious substances other than oil, sewage and garbage. Another delegation proposed that the provisions relating to oil pollution should be dealt with in the form of amendments to the 1954 Oil Pollution Convention and the provisions relating to all harmful substances other than oil should be included in a new composite Convention.

² Some delegations proposed the insertion after this paragraph of an additional paragraph by which the Conference would recognize the Oil Pollution Convention, 1954, as the first international instrument directly aimed at protecting the environment and the significant contribution which that Convention has made in protecting the sea and coastal areas from pollution. Other delegations considered that such a statement would more appropriately be included in a Conference Resolution (see draft Resolution 1).

³ Some delegations suggested that the words "as between the Parties to both Conventions" should be inserted after "supersede".

⁴ (1) Some delegations felt that it would be necessary to clarify this phrase in view of the possibility that a fixed or floating platform may be owned or operated by Nationals of one Contracting State, thus falling under the authority of that State, but be operated in an area under the jurisdiction of another Contracting Government.

(ii) Some delegations were of the view that as the coastal State had sovereign rights over the resources of its continental shelf platforms engaged in exploration or exploitation of its continental shelf would always be under its authority.

(4) (a) "Discharge" in relation to harmful substances, or effluent containing these substances means any release howsoever caused from a ship.⁵

(b) "Discharge" does not include:

(i) dumping within the meaning of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter at Sea, 1972;

(ii) release of harmful substances directly arising from the exploration, exploitation and associated off-shore processing of sea-bed mineral resources.

(5) "Ship" means a vessel of any type whatsoever and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms operating in the marine environment.

(6) "Organization" means the Inter-Governmental Maritime Consultative Organization.

ARTICLE 3.—APPLICATION

(1) The present Convention shall apply to:

(a) Ships entitled to fly the flag of a Contracting State [including the territories to which reference is made in Article 19(2)]⁶ and

(b) ships not entitled to fly a flag but which operate under the [authority]⁷ of a Contracting State.

(2) The present Convention shall not apply to any warship or other ship owned or operated by a State and used for the time being, only on government non-commercial service.⁸ However, each Contracting State shall ensure by the adoption of appropriate measures that such ships owned or operated by it act in a manner consistent with the object and purpose of the present Convention.

*Alternative I*⁹

ARTICLE 4.—PENALTIES

(1) Any discharge of harmful substances or effluent containing these substances in contravention of the provisions of the Regulations shall be prohibited under: (a) the law of the Administration of the ship; [and] [or] (b) the law of any other Contracting State when the discharge occurs within its territorial seas.¹⁰

(2) The penalties provided under the law of a Contracting State in respect of unlawful discharge of harmful substances or effluent containing these substances shall be adequate in severity to discourage any such unlawful discharge. The penalties provided for in respect of unlawful discharge outside the territorial seas¹⁰ of a Contracting State shall be no less severe than the penalties provided for under the law in respect of the same infringement within its territorial seas.¹⁰

⁵ Some delegations suggested the addition at the end of the sentence of the words "and includes, but is not limited to, any escape, spilling, leaking, pumping, emitting or emptying".

⁶ See footnote 78 under Article 19.

⁷ See footnote 4.

⁸ Several delegations preferred the following wording: "The present Convention shall not apply to warships and naval auxiliaries." Some delegations were of the opinion that if this alternative wording was not adopted, at least the words "or operated" and "for the time being" should be deleted.

⁹ Some delegations suggested that an additional paragraph be added to Article 4, whichever alternative is accepted, as follows:

"Any Contracting State may cause proceedings to be taken when any ship to which the present Convention applies enters its ports or off-shore terminals, in respect of any violation by that ship, or its owner or master, of the requirements of the Convention, wherever the violation occurred, provided, however, that such proceedings are commenced no later than [three] years after the violation occurred. Whenever one Contracting State has commenced such proceedings, no other proceedings in respect of the same violation may be commenced by any other Contracting State except for the Administration of the ship or any State within whose territorial sea¹⁰ the violation occurred. A report of any such proceedings shall be sent to the Administration of the ship."

It was suggested that the period of time indicated in square brackets "[three]" should be related to the period indicated in Regulation 23 of Annex I. Other delegations took the view that the concept contained in the present footnote could only be accepted subject to one or more of the following additional qualifications:

(a) The violation occurred within [50] nautical miles from the nearest land of the State exercising jurisdiction under this provision;

(b) The Administration reserves the right to take over the prosecutions for any violation which has occurred outside the territorial seas¹⁰ of a Contracting State; and

(c) The proceedings could take place only with the consent of the Administration.

One delegation suggested that for (c) above, tacit consent would be sufficient.

¹⁰ Some delegations expressed a preference for a term other than "territorial seas" such as "waters under its jurisdiction", "areas under national jurisdiction" or "within the limits of national jurisdiction".

*Alternative II*⁹

ARTICLE 4.—VIOLATION

(1) Any violation of the requirements of the present Convention shall be prohibited under the law of the Administration of the ship concerned wherever the violation occurs. If the Administration is informed of such a violation and is satisfied that sufficient evidence is available in the form required by its law to enable proceedings to be brought in respect of the alleged violation, it shall cause such proceedings¹¹ to be taken as soon as possible.

(2) Any violation of the requirements of the present Convention within the territorial seas¹⁰ of any Contracting State shall be prohibited under the law of that State. Whenever such a violation occurs, that State shall either:

(a) Cause proceedings to be taken with respect to such violation, or

(b) Furnish to the Administration of the ship such information and evidence as may be in its possession that a violation has occurred.

(3) Where information or evidence with respect to any violation of the Convention by a ship is furnished to the Administration of that ship, the Administration shall promptly inform the State which has furnished the information or evidence and the Organization of the action taken.

(4) The penalties provided for under the law of a Contracting State in respect of any violation of the requirements of the present Convention shall be adequate in severity to discourage any such violation. The penalties provided for in respect to violation outside the territorial seas¹⁰ of a Contracting State shall be no less severe than the penalties provided for under the law in respect of the same infringement within its territorial seas.¹⁰

ARTICLE 5.—CERTIFICATES AND SPECIAL RULES ON INSPECTION OF SHIPS

(1) Subject to the provisions of paragraph (2) of this Article a Certificate issued under the authority of a Contracting State in accordance with the provisions of the Regulations shall be accepted by the other Contracting States and regarded for all purposes covered by the present Convention as having the same validity as a Certificate issued by them.

(2) A ship required to hold a certificate in accordance with the provisions of the Regulations is subject while in the ports or off-shore terminals under the jurisdiction of another Contracting State to inspection by officers duly authorized by that State.¹² Any inspection concerning the implementation of the provisions covered by the certificate and carried out by a foreign State¹³ within its territory or in off-shore terminals under its jurisdiction shall be limited to verifying that there is on board a valid Certificate, unless there are clear grounds¹⁴ for believing that the condition of the ship or its equipment does not correspond substantially with the particulars of that certificate. In that case, or if the ship does not carry a valid certificate, the State¹³ carrying out the inspection shall take such steps as will ensure that the ship shall not sail until it can proceed to sea without presenting an unreasonable threat of harm to the marine environment.¹⁵ That State may, however, grant such a ship permission to leave the port or off-shore terminal for the purpose of proceeding to the nearest repair yard available.^{16 17}

¹¹ Some delegations were of the opinion that this provision is too stringent, since it obliges Administrations to take proceedings which would have problems with regard to their national system of law according to which the proceeding authority is free to decide whether or not a proceeding is opportune. A less strictly formulated provision would therefore increase the acceptability of the whole Article.

¹² Some delegations were of the opinion that the initial wording may give the impression that inspection will be allowed only to ships required to hold a certificate. In order to avoid such an impression, they suggested paragraph (2) to begin as follows: "As to ships required to hold a certificate issued in accordance with the provisions of the Regulations, any inspection made by an officer duly authorized and concerning the implementation etc."

¹³ Some delegations suggested to substitute the words "a foreign State" and "the State" by "officers".

¹⁴ Some delegations suggested that the phrase "clear grounds" in paragraph (2), (4) and (5) should be replaced by "reasonable grounds".

¹⁵ Some delegations were of the opinion that the phrase "without presenting an unreasonable threat of harm to the marine environment" should be replaced by the phrase "until such deficiency is corrected".

¹⁶ Some delegations suggested that the phrase "nearest repair yard available" was unduly restrictive of the place in which the ship could most suitably be repaired.

¹⁷ Some delegations suggested that there be a provision obliging the Administration, and owner or master of a ship, to co-operate with any Contracting States which desire to conduct inspection pursuant to this Article.

Some delegations suggested that inspection be limited to inspection of slop tanks or other tanks especially provided for wastes and also to the inspection of documents connected with such tanks.

(3) In the event of the inspection provided for in this Article giving rise to action of any kind, the State carrying out the inspection shall immediately inform in writing the consul or diplomatic representative of the State whose flag the ship is entitled to fly of this action and of the circumstances thereof.

[(4) If a Contracting State has clear grounds¹⁴ for believing that a ship wishing to enter its ports or use off-shore terminals under its jurisdiction is not constructed in accordance with¹⁵ the provisions of the Regulations applicable to that ship, such State may request consultation with the government of that State whose flag the ship is entitled to fly. If after such consultation, or otherwise, the Contracting State [establishes] [is satisfied] that the ship does not comply with the Regulations in question such State [may/shall] for this reason deny the ship access to such ports and off-shore terminals until such time as that State is satisfied that the ship does comply with the Regulations.]

[(5) Notwithstanding the provisions of Article 3(1) of the present Convention [five years] after the entry into force of the present Convention a Contracting State [may/shall] deny access to or permission to leave ports or off-shore terminals under its jurisdiction to any ship entitled to fly the flag of a non-Contracting State if the Contracting State has clear grounds¹⁴ for believing that the ship does not comply with the provisions of the Regulations. That State may, however, grant such a ship permission to leave the port or off-shore terminal for the purpose of proceeding to the nearest repair yard available,¹⁶ if it is satisfied and that such voyage will not present an unreasonable threat of harm to the marine environment.]^{15 19}

ARTICLE 6²⁰.—DETECTION OF OFFENCES AGAINST AND ENFORCEMENT OF THE CONVENTION

(1) Contracting States shall co-operate in the detection of offences and the enforcement of the provisions of the present Convention using all appropriate and practicable measures of detection and environmental monitoring, adequate reporting procedures and accumulation of evidence.

(2) A ship to which the present Convention applies may be subject in loading ports, to inspection by officers appointed or authorized by Contracting States for the purpose of determining whether any harmful substances have been discharged in contravention of the provisions of the Regulations. The report of such inspection shall be forwarded to the Administration for any appropriate action.^{21 22}

(3) Any Contracting State shall furnish to the Administration evidence, if any, that the ship has discharged harmful substances or effluent containing such substances in contravention of the provisions of the Regulations.²³ If it is practicable to do so, the competent authority of the former State shall notify the master of the ship of the alleged contravention.

(4) Upon receiving such evidence, the Administration so informed shall investigate the matter, and may request the other State to furnish further or

¹⁴ Some delegations suggested that the phrase "is not constructed in accordance with" should be replaced by the phrase "does not comply with".

¹⁵ Some delegations suggested that paragraphs (3), (4) and (5) should be replaced by the following:

(3) If a Contracting State denies a foreign ship access to ports in its territory or to off-shore terminals under its jurisdiction or takes any action against such a ship for the reason that the ship does not comply with the provisions in the present Convention, the State shall immediately inform the consul or diplomatic representative of the State whose flag the ship is entitled to fly. The State may before taking such action request consultation with the Administration. Information shall also be given to the Administration when a ship does not carry a valid certificate in accordance with the provisions of the Regulations.

²⁰ Some delegations were of the opinion that if Alternative II of Article 4 is accepted, when it would be appropriate to revise the provisions of Article 6 to cover detection of all violations of the Convention.

²¹ (i) It was suggested that the restriction of the right of inspection to ships in "loading ports" might not be appropriate, and that this might usefully be extended, for example, to cover ships in ports and offshore terminals of any Contracting State.

(ii) See footnote 17 of Article 5. It was also pointed out that this paragraph might have some connexion with Regulation 21(6) of Annex I.

²² Some delegations favoured the following wording of paragraph (2) of this Article: "If it appears in connexion with loading or unloading or otherwise that harmful substances have been discharged in contravention of the present Convention, or that there is danger of such discharge, the inspecting officer shall report his observations to the appropriate authority. The State which undertakes the inspection shall forward the report to the Administration for appropriate action."

²³ Some delegations were of the opinion that the obligation stated in this paragraph should not apply to a State which had itself commenced proceedings under the provisions of Article 4.

better evidence of the alleged contravention. If the Administration so informed is satisfied that sufficient evidence is available in the form required by its law to enable proceedings to be brought in respect of the alleged contravention, it shall cause such proceedings to be taken as soon as possible.²⁴ The Administration shall promptly inform the State which has reported the alleged contravention, as well as the Organization, of the action taken.²⁵

(5) A Contracting State [may/shall] investigate a ship entitled to fly the flag of another Contracting State when it enters the ports or off-shore terminals under its jurisdiction, if a report is received from any Contracting State that the ship has discharged harmful substances or effluent containing these substances or has otherwise contravened the Convention in any place, and shall send the report of such investigation to the State first reporting the offence and to the Administration so that the appropriate action may be taken under the present Convention.^{26 27 28}

(6) All possible effort shall be made to avoid the ship being unduly delayed through action under this Article.

ARTICLE 7²⁹.—REPORTS ON INCIDENTS INVOLVING HARMFUL SUBSTANCES

(1) For the purposes of this Article an "incident" means an event involving the actual or probable discharge of a harmful substance.³⁰

(2) The master of a ship³¹ involved in an incident, shall report the particulars of such incident without delay in accordance with the provisions of this article.

(3) Reports shall be made by radio whenever possible but in any case by the fastest channels available at the time.

(4) Reports by radio shall be made by urgent broadcast.

(5) When a Contracting State receives a report under the provisions of the present Article, that State shall relay the report without delay to the Administration of the ship involved and to any other State that may be affected.

(6) The report shall be made whenever an incident involves:

(a) A discharge permitted under this present Convention by virtue of the fact that:

(i) It is for the purpose of securing the safety of the ship or saving life at sea; or

(ii) It results from damage to the ship or its equipment; or

(iii) It is for the purpose of combating a specific pollution incident; or

(b) A discharge other than as permitted under the present Convention; or³²

(c) The discharge into the sea of any package, cargo container or portable tank containing harmful substances or the contents thereof.³³

(7) The report shall³⁴ contain the time, position, wind and sea conditions at the time of the incident, details of the state of the ship and likely state of the

²⁴ See footnote 11 under Article 4 in Alternative II.

²⁵ If Alternative II of Article 4 is accepted, the last two sentences of this paragraph would be unnecessary.

²⁶ If the proposals for a wider basis of enforcement and inspection of the Convention are adopted, then the need for this paragraph should be reconsidered.

²⁷ Some delegations suggested that if paragraph (5) is not mandatory, it should be worded as follows: "If a Contracting State investigates a foreign ship due to a report from any State the State shall send a report of such investigation etc."

²⁸ Some delegations were of the opinion that a Contracting State may investigate a ship entitled to fly the flag of another Contracting State only with the consent of the Administration.

²⁹ Some delegations considered it inappropriate to include in the Articles of the Convention all the detailed provisions on reporting procedures, and felt that such detailed provisions might more appropriately be included in a special mandatory Annex on Reporting.

³⁰ Some delegations were of the opinion that the word "incident", for example should be qualified so as to cover only "significant discharges of harmful substances".

³¹ Some delegations suggested further consideration should be given on the merits of requiring Masters of all ships not directly involved in an incident to report.

³² Some delegations were of the opinion that since all possible cases of discharge of which reports should be made are covered by sub-paragraphs (6) (a) and (c), sub-paragraph (6) (b) should relate only to discharges resulting from an error of a crew member. It was proposed, therefore, that:

In sub-paragraph (6) (a) to delete the words "permitted under the present Convention";

In sub-paragraph (6) (a) (ii) to add "from an error of a crew member"; and

Delete sub-paragraph (6) (b).

³³ One delegation suggested the addition of the following new sub-paragraph (d):

"(d) casualties to ships which involve a threat of a discharge referred to in sub-paragraphs (a), (b) or (c) of this paragraph".

³⁴ Some delegations were of the opinion that the words "as far as possible" should be inserted here.

cargo and any other relevant information with respect to the incident and, further, where the incident involves:

(a) Oil, as defined in Annex I of the present Convention, the report shall include the description and quantity of oil carried and the quantity which has been discharged or which may be discharged into the sea;

(b) A noxious substance, as defined in Annex II of the present Convention, the report shall include a clear indication of the noxious substances carried, including the correct technical names (not trade names) and a statement or estimate of the quantities and concentrations of such substances discharged or that may be discharged into the sea, and, if possible, the name of the consignor/consignee or manufacturer;

(c) Harmful substances carried in packages, cargo containers or portable tanks, the report shall include the correct technical names of the harmful substances, the quantities and concentrations of such substances discharged or that may be discharged, the description of the packaging and, if possible, any identifying marks and the name of the consignor/consignee or manufacturer.

(8) The Master shall:

(a) Supplement the initial report, as necessary, to communicate information concerning further developments; and

(b) Comply as fully as possible with requests from affected States for additional information concerning the incident.

(9) In the event of the ship being abandoned, the owners, charterers or their agents³⁵ shall make the report or supplement the report of the Master with details of damage to the ship, likely state of the cargo, a complete list of harmful substances on board, their stowage position, a statement or estimate of the quantity and concentration of such substances discharged or that may be discharged, as well as any other relevant information, and in general assume the obligations placed upon the Master under the present Article.

(10) Each Contracting State shall:

(a) Make all arrangements necessary for an appropriate officer or agency to receive and process all reports on incidents involving harmful substances; and

(b) Advise the Organization with complete details of such arrangements for circulation to other Contracting States and Member States.

ARTICLE R.—POWERS OF CONTRACTING STATES³⁶

[(1) Nothing in the present Convention shall be construed as derogating from the powers of any Contracting State to take stricter measures within its jurisdiction in respect of any matter to which the Convention relates or as extending the jurisdiction of any Contracting State.³⁷

(2) A Contracting State shall not within its jurisdiction [in respect of ships to which the Convention applies other than its own ships]³⁸ impose regulations in respect of pollution control regarding ship design [and manning]³⁹ which are not in accordance with the provisions of the Regulations].⁴⁰

³⁵ One delegation was of the opinion that it would not be proper to refer to "owners, charterers or their agents" in this context but that the obligation should be addressed to Contracting Governments.

³⁶ (i) Some delegations proposed the deletion of paragraph (1) as this matter is already covered by the existing international law.

(ii) Several delegations proposed the deletions of paragraph (2) as such a provision would restrict the right of a Contracting State to impose more stringent regulations within its jurisdiction.

(iii) Some delegations proposed the deletion of Article 8 entirely, as such provisions do not appear in other technical conventions.

(iv) Final decision on this Article would affect the texts of certain Regulations in Annexes, e.g. Regulation 9 of Annex I.

³⁷ Some delegations suggested that this paragraph should read as follows: "Nothing in the present Convention shall be construed as derogating from the rights of coastal States within the limits of their national jurisdiction, including the right to adopt stricter measures in respect of any matter to which the Convention relates."

³⁸ Some delegations suggested the deletion of the square brackets.

³⁹ Some delegations suggested the deletion of the square brackets around "and manning", while other delegations suggested the deletion of the words "and manning".

⁴⁰ Some delegations considered that the right of a Contracting State to impose more stringent regulations should be limited to operational matters.

ARTICLE 9.—OTHER TREATIES, CONVENTIONS AND AGREEMENTS ⁴¹

(1) Upon the entry into force of Annex I, the present Convention supersedes the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended, as between Contracting States.

(2) Nothing in the present Convention shall prejudice the codification and development of the law of the sea by the United Nations Conference on the Law of the Sea convened pursuant to Resolution 2750 C (XXV) of the General Assembly of the United Nations nor the present or future claims and legal views of any State concerning the law of the sea and the nature and extent of coastal and flag State jurisdiction.⁴²

[SUSPENSION IN CASES OF WAR]⁴³ARTICLE 10.—SETTLEMENT OF DISPUTES ⁴⁴*Alternative I*

Any dispute between two or more Contracting States concerning the interpretation or application of the present Convention shall, if settlement by negotiation between the States involved has not been possible, be referred at the request of either party to the International Court of Justice for decision unless the parties in dispute agree to submit it to arbitration.⁴⁵

Alternative II

Any dispute between two or more Contracting States concerning the interpretation or application of the present Convention shall, if settlement by negotiation between the States involved has not been possible, and if these States do not otherwise agree, be submitted upon request of any of them to arbitration as set out in the Annex to this Article.

Alternative III

If any dispute arises between two or more of the Contracting States relating to the interpretation or application of the present Convention those Contracting States shall consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration judicial settlement or other peaceful means of their own choice.

⁴¹ Some delegations suggested that consideration should be given to a possible insertion of the following additional paragraph:

"Nothing in the present Convention shall be construed as derogating from the requirements of any international convention in force concerning the safety of ships and human life at sea in respect of any matter to which the present Convention relates."

⁴² (i) Several delegations suggested that this paragraph should be deleted but presented in the form of a Conference Resolution.

(ii) Some delegations suggested that the words "nor the present or future claims . . . flag State jurisdiction" should be amended to read "nor the rights and legal views of any State concerning matters related to the law of the sea."

⁴³ Some delegations suggested the insertion of the following new Article:

"SUSPENSION IN CASES OF WAR

"(1) In case of war or other hostilities, a Contracting State which considers that it is affected, whether as a belligerent or as a neutral may suspend the operation of the whole or any part of the present Convention. The suspending State shall immediately give notice of any suspension to the Organization.

"(2) Such suspension shall not deprive another Contracting State of any right of control under the present Convention over the ships of the suspending State when such ships are in their ports or off-shore terminals.

"(3) The suspending State may at any time terminate such suspension and shall in any event terminate as soon as it ceases to be justified under paragraph (1) of this Article. Notice of such termination shall be given immediately to the Organization by the State concerned.

"(4) The Organization shall notify all Contracting States of any suspension or termination of suspension under this Article."

⁴⁴ One delegation suggested that the provisions of this Article should be presented in the form of an optional Protocol to the Convention.

⁴⁵ Some delegations felt that even if the Diplomatic Conference decided to retain this first alternative for Article 10, it would still be helpful for Parties in a dispute to have available to them the rules on arbitration set out in the Annex to the second alternative. In that case the last words of the Article itself (first alternative) could read ". . . to arbitration as set out in the Annex to the present Article", and the Articles 2 and 4 of the Annex would have to be adapted while Article 5 of the Annex would have to be left out.

Article 1

Arbitration procedure, unless the Parties to the dispute decide otherwise, shall be in accordance with the rules set out in this Annex.

Article 2

(1) An Arbitration Tribunal shall be established upon the request of one Contracting State addressed to another in application of Article 11 of the Convention. The request for arbitration shall consist of a statement of the case together with any supporting documents.

2. The requesting Party shall inform the Secretary-General of the Organization of the fact that it has applied for the establishment of a Tribunal, of the names of the other State or States Party to the dispute, and of the Articles or Regulations of the Convention over which there is in its opinion disagreement concerning their interpretation or application. The Secretary-General shall transmit this information to all Contracting States.

Article 3

The Tribunal shall consist of three members: one Arbitrator nominated by each Party to the dispute and a third Arbitrator who shall be nominated by agreement between the two first named, and shall act as its Chairman.

Article 4

(1) If, at the end of a period of 60 days from the nomination of the second Arbitrator, the Chairman of the Tribunal shall not have been nominated, the Secretary-General of the Organization upon request of either Party shall within a further period of 60 days proceed to such nomination, selecting from a list of qualified persons previously drawn up by the Council of the Organization.

(2) If, within a period of 60 days from the date of the receipt of the request, one of the Parties shall not have nominated the member of the Tribunal for whose designation it is responsible, the other Party may directly inform the Secretary-General of the Organization who shall nominate the Chairman of the Tribunal within a period of 60 days, selecting him from the list prescribed in paragraph (1) of the present Article.

(3) The Chairman of the Tribunal shall, upon nomination, request the Party which has not provided an Arbitrator, to do so in the same manner and under the same conditions. If the Party does not make the required nomination, the Chairman of the Tribunal shall request the Secretary-General of the Organization to make the nomination in the form and conditions prescribed in the preceding paragraph.

(4) The Chairman of the Tribunal, if nominated under the provisions of the present Article, shall not be or have been a national of one of the Parties concerned, except with the consent of the other Party.

(5) In the case of the decease or default of an Arbitrator for whose nomination one of the Parties is responsible, the said Party shall nominate a replacement within a period of 60 days from the date of decease or default. Should the said Party not make the nomination, the arbitration shall proceed under the remaining Arbitrators. In case of the decease or default of the Chairman of the Tribunal, a replacement shall be nominated in accordance with the provisions of Article 3 above, or in the absence of agreement between the members of the Tribunal within a period of 60 days of the decease or default, according to the provisions of the present Article.

Article 5

The Tribunal may hear and determine counter-claims arising directly out of the subject matter of the dispute.

Article 6

Unless the Tribunal determines otherwise because of the particular circumstances of the case, the expenses of the Tribunal including the remuneration of its members shall be borne in equal shares by each side.⁴⁷

⁴⁶ It is emphasized that the "Annexes" suggested for Alternatives I and II of these draft provisions shall have the same status as the other Articles of the Convention and shall not be equated in any way with Annexes as referred to in Article 1 of the Convention.

⁴⁷ Some delegations preferred the following text for Article 6:

"The arbitration costs including the arbitrators' fees shall be apportioned by the tribunal as it deems fit."

Article 7

If a procedure has been initiated between two Parties, any other Contracting State which considers that it has an interest of a legal nature which may be affected by the decision in the case may join in the arbitration procedure by giving written notice to the Parties which have originally initiated the procedure unless either of the latter Parties object to such joinder.

Article 8

Any Arbitration Tribunal established under the provisions of the present Annex shall decide its own rules of procedure.

Article 9

(1) Decisions of the Tribunal both as to its procedure and its place of meeting and as to any controversy laid before it, shall be taken by majority vote of its members; the absence or abstention of one of the members of the Tribunal for whose nomination the Parties were responsible shall not constitute an impediment to the Tribunal reaching a decision. In cases of equal voting, the Chairman shall cast the deciding vote.

(2) The Parties shall facilitate the work of the Tribunal and in particular, in accordance with their legislation, and using all means at their disposal:

(a) Provide the Tribunal with the necessary documents and information;

(b) Enable the Tribunal to enter their territory, to hear witnesses or experts, and to visit the scene.

(3) Absence or default of one Party shall not constitute an impediment to the procedure.

Article 10

(1) The award of the Tribunal shall be accompanied by a statement of reasons. It shall be final and without appeal. The Parties shall immediately comply with the award.

(2) Any controversy which may arise between the Parties as regards interpretation and execution of the award may be submitted by either Party for judgment to the Tribunal which made the award, or, if it is not available to another Tribunal constituted for this purpose in the same manner as the original Tribunal.

ARTICLE 11.—COMMUNICATION OF INFORMATION

(1) The Contracting States undertake to communicate to the Organization:

(a) The text of laws, orders, decrees and regulations and other instruments which have been promulgated on the various matters within the scope of the present Convention;

(b) A list of non-governmental agencies which are authorized to act on their behalf in matters relating to the design, construction and equipment of ships carrying harmful substances in accordance with the provisions of the Regulations;

(c) A sufficient number of specimens of their certificates issued under the provisions of the Regulations;

(d) A list of shore reception facilities including their location, capacity and available facilities and other characteristics;

(e) Official reports or summaries of official reports insofar as they show the results of the application of the present Convention; and

(f) An annual statistical report, in a form standardized by the Organization, of penalties actually imposed for infringement of the present Convention.

(2) The Organization shall notify Contracting States of the receipt of any communications under this Article.⁴⁸

ARTICLE 12.—CASUALTIES TO SHIPS

(1) Each Administration undertakes to conduct an investigation of any casualty occurring to any of its ships subject to the provisions of the Regulations

⁴⁸ Several delegations suggested that the following words should be added at the end of the sentence "and circulate to all Contracting States any information communicated to it under sub-paragraphs 1(b) to (f) of this Article".

if such casualty has produced a major deleterious effect upon the marine environment.⁴⁹

(2) Each Contracting State undertakes to supply the Organization with information concerning the findings of such investigation,⁵⁰ when it judges that such information may assist in determining what changes in the present Convention might be desirable.

ARTICLE 13.—SIGNATURE, RATIFICATION, ACCEPTANCE, APPROVAL AND ACCESSION

(1) The present Convention shall remain open for signature for six months from _____ 1973, and shall thereafter remain open for accession. States [Members of the United Nations, or of any of the Specialized Agencies, or of the International Atomic Energy Agency or parties to the Statute of the International Court of Justice]⁵¹ may become Parties to the present Convention by:

- (a) Signature without reservation as to ratification, acceptance or approval, or
- (b) Signature subject to ratification, acceptance or approval, followed by ratification, acceptance or approval, or
- (c) Accession.

(2) Ratification, acceptance, approval or accession shall be effected by the deposit of an instrument to that effect with the Organization.

(3) The Organization shall inform all States which have signed the present Convention or acceded to it of the deposit of any new instrument and the date of the deposit. The Organization shall also inform all States which have already signed the present Convention of any signature effected during the six months from _____, 1973.

ARTICLE 14.—RESERVATIONS

Alternative I

No reservations may be made to the present Convention.⁵²

Alternative II

Each Contracting State may, at the time of signing, ratifying, accepting, approving or acceding to the present Convention, declare that it does not consider itself bound by any of the following provisions (to be specified).⁵³

ARTICLE 15.—OPTIONAL ANNEXES

(1) A State may at the time of signing, ratifying, accepting, approving or acceding to the present Convention declare that it does not accept any one or all of Annexes III, IV and V (hereinafter referred to as "optional Annexes") of the present Convention. [Every new Annex to the present Convention shall be considered as an optional Annex].⁵⁴

(2) A State which has declared that it is not bound by an optional Annex may at any time accept such Annex by depositing with the Organization an Instrument of the kind referred to in Article 13 (2).

(3) A State which makes a declaration under paragraph (1) of this Article in respect of an optional Annex and which has not subsequently accepted that Annex in accordance with paragraph (2) of this Article shall not be under any obligation nor entitled to claim any privileges under the present Convention in respect of matters related to such Annex and all references to Contracting States in the present Convention shall not include that State insofar as matters related to such Annex are concerned.

⁴⁹ (i) Several delegations suggested that such investigation should be limited to casualties where the Administration judges that it may assist in determining what changes in the present Convention might be desirable.

(ii) Some delegations expressed the view that an additional provision should be made authorizing a Contracting State to investigate casualties causing pollution which occur in areas generally recognized as international waters but which may affect the waters of the investigating State. Other delegations reserved their positions on this suggestion stating that jurisdictional and Law of the Sea issues were involved which could preclude such a provision.

⁵⁰ Some delegations suggested the addition of the following words to this paragraph: "and other investigations conducted on casualties occurring to ships entitled to fly the flag of another State".

⁵¹ Several delegations suggested that the words in square brackets should be deleted.

⁵² Several delegations favoured the deletion of Alternative I.

⁵³ Some delegations considered that reservations may be made not only for Articles but also for certain Regulations in Annexes.

(4) The Organization shall inform the States which have signed or acceded to the present Convention of any declaration under this Article as well as the receipt of any instrument deposited in accordance with the provisions of paragraph (2) of this Article.

ARTICLE 16.—ENTRY INTO FORCE

(1) The present Convention shall enter into force twelve months after the date on which not less than [10] States the combined merchant fleets of which constitute not less than [50] per cent of the gross tonnage of the world's merchant shipping have become parties to it in accordance with Article 13.

(2) An optional Annex shall enter into force twelve months after the date on which the conditions stipulated in paragraph (1) of this Article have been satisfied in relation to that Annex.⁵⁴

(3) The Organization shall inform the States which have signed or acceded to the present Convention of the date on which it enters into force and of the date on which an optional Annex enters into force in accordance with paragraph (2) of this Article.

(4) For States which have deposited an instrument of ratification, acceptance, approval or accession in respect of the present Convention or any optional Annex after the requirements for the entry into force thereof have been met but prior to the date of entry into force, the ratification, acceptance, approval or accession shall take effect on the date of entry into force of the Convention or such Annex or three months after the date of deposit of the instrument whichever is the later date.

(5) After the date on which all the conditions required under Article 17 to bring an amendment to the present Convention or an optional Annex into force have been fulfilled, any instrument of ratification or accession deposited shall apply to the Convention or Annex as amended.

ARTICLE 17.—AMENDMENTS ⁵⁵

(1) The present Convention may be amended by any of the procedures specified in paragraphs (2), (3) and (4) of this Article.

(2) Amendment by unanimous acceptance: ⁵⁶

(a) Upon the request of a Contracting State, any amendment proposed by it to the present Convention shall be communicated by the Organization to all Contracting States for acceptance.

⁵⁴ One delegation suggested that all Annexes should enter into force at the same time irrespective of whether certain States have declared that they do not accept certain optional Annexes.

⁵⁵ As regards acceptance of amendments by States and as regards the effect of amendments coming into force, some delegations—which on the first point were in favour of a procedure of tacit acceptance confined to the technical Annexes alone, to the exclusion of the Articles of the Convention and which on the second point took the view that amendments should only enter into force in respect of those States which had accepted them either expressly or tacitly—opposed the concept of “amendment of an important nature”, which they considered to be contrary to the principles of the effect relative to treaties and violated the sovereign rights of States. The argument advanced to justify the notion of an important amendment—the need to have a uniform rule—does not achieve the desired objective in that one of two States would be excluded from a Convention against their wishes and, instead of being bound by all the provisions of that Convention (with the exception of an amendment which a State does not accept), would be “expelled” from the Convention whose application would thus be restricted.

As concerns the body which would adopt amendments, these delegations opposed the traditional system whereby the organs of IMCO—the Maritime Safety Committee and the Assembly—adopt amendments. These delegations considered as inadequate and unsatisfactory the procedure followed in the Convention for Safe Containers adopted in Geneva in December 1972: the “enlarged” IMCO organs—composed, in addition to IMCO Member States, of States Parties to a Convention having the right to participate in the discussions and the right to vote (which, in some cases, would pose legal problems of compatibility with the provisions of the IMCO Convention itself)—would not be sufficiently representative or adequately qualified, since they would comprise a large number of IMCO Member States which were not Parties to the Convention being amended. The only satisfactory system which would conform to legal principles is that of a Revision Commission, a body composed only of those States which are Parties to the Convention in question, and IMCO Member States which were not Parties would be excluded. In this way, a Convention would only be amended by the States directly concerned and by them alone. In the view of these delegations, this is the sole effective means of diminishing the imbalance which exists at present between the various stages whereby amendments are adopted by the IMCO Member States and accepted solely by States Parties to a Convention.

⁵⁶ Several delegations suggested that this paragraph should be deleted as this procedure has never been used.

(b) Any such amendment shall be deemed to have been accepted at the end of a period of [twelve]⁵⁷ months after it is first communicated, unless within that period one or more Contracting States inform the Organization that they do not accept the amendment.

(c) The amendment deemed to have been accepted shall enter into force at the end of a period of [six] months or such other period as may be specified in the amendment, after the date of its acceptance in accordance with sub-paragraph (b) of this paragraph.

(d) The amendment shall enter into force with respect to all Contracting States.

(3) Amendment after consideration in the Organization :

Upon the request of a Controlling State any amendment proposed by it to the present Convention will be considered in the Organization in accordance with the procedures laid down in this paragraph.

(a) Amendment to the Articles of the Convention :⁵⁸

(i) Any proposed amendment to the Articles of the present Convention shall be submitted to the Maritime Safety Committee of the Organization for consideration. If adopted by a two-thirds majority of those present and voting in the Maritime Safety Committee, such amendment shall be communicated to all Members of the Organization and all Contracting States at least [six] months prior to its consideration by the Assembly of the Organization. Any Contracting State which is not a Member of the Organization shall be entitled to participate⁵⁹ when the amendment is considered by the Assembly.

(ii) If adopted by a two-thirds majority of those present and voting in the Assembly, the amendment shall be communicated by the Organization to all Contracting States for acceptance.

(iii) Such amendment shall be deemed to have been accepted on a date on which it is accepted by two-thirds of the Contracting States or by Contracting States the combined merchant fleets of which constitute not less than [fifty] per cent of the gross tonnage of the world's merchant shipping, whichever condition is first achieved.⁶⁰

(iv) The amendment accepted in accordance with sub-paragraph (a) (iii) of this paragraph shall enter into force [six] months after the date of its acceptance.

(v) The amendment shall enter into force with respect to all Contracting States [except those which, before it enters into force, make a declaration that they do not accept the amendment] [provided that a Contracting State may exempt itself from giving effect to the provisions of the amendment for a period not exceeding [twelve] months from the date of entry into force of that amendment.]⁶¹

(vi) The Assembly, by a two-thirds majority of those present and voting, including two-thirds of the States represented on the Maritime Safety Committee and present and voting in the Assembly⁶² may propose a determination at the time of its adoption that the amendment is of such an important nature that any Contracting State which makes a declaration under sub-paragraph (a) (v) of this paragraph and which does not accept the amendment within a period of

⁵⁷ One delegation suggested that twelve months should be amended to twenty-four months.

⁵⁸ Some delegations suggested that the Articles of the Convention should be amended by tacit acceptance procedure as provided for in sub-paragraph (vi) of this paragraph.

⁵⁹ Some delegations suggested that the words "and vote" should be added after "participate". Doubt was, however, expressed as to whether granting to a Contracting State not being an IMCO Member the right to vote in the IMCO Assembly might conflict with the provisions of the IMCO Convention.

⁶⁰ Some delegations suggested that this sub-paragraph should be amended to read as follows: "Such amendment shall be deemed to have been accepted on a date on which it is accepted by two-thirds of the Contracting States or by [10] Contracting States the combined merchant fleet of which constitutes not less than [fifty] per cent of the gross tonnage of the world's merchant shipping, or by [25] Contracting States, whichever condition is first achieved".

⁶¹ Consideration should be given to whether the contents of either one or the other of the phrases in square brackets may be retained or they can be combined.

⁶² Some delegations suggested the deletion of the words "including two-thirds of the States represented on the Maritime Safety Committee and present and voting in the Assembly".

[twelve] months after it enters into force, shall cease to be a party to the present Convention upon the expiry of that period.⁶³

This determination is subject to the acceptance of two-thirds of the Contracting States prior to the entry into force of the amendment.⁶⁴

(b) Amendment to Annexes:

(i) An amendment to an Annex to the present Convention shall be submitted to the Maritime Safety Committee for consideration. If adopted by a two-thirds majority of those present and voting in the Maritime Safety Committee, such amendment shall be communicated to all Members of the Organization and all Contracting States at least [six] months prior to its consideration by the Assembly. Any Contracting State which is not a Member of the Organization shall be entitled to participate⁶⁵ when the amendment is considered by the Assembly.

(ii) If adopted by a two-thirds majority of those present and voting in the Assembly, the amendment shall be communicated by the Organization to all Contracting States for acceptance.

(iii) Such amendment shall be deemed to have been accepted at the end of a period to be determined by the Assembly at the time of its adoption, unless within that period objection is communicated to the Organization by more than one-third of the Contracting States or by Contracting States the combined merchant fleets of which constitute not less than [fifty] per cent of the gross tonnage of the world's merchant fleet, whichever condition is achieved.⁶⁶

(iv) The amendment deemed to have been accepted shall enter into force on the date determined by the Assembly at the time of adoption of the amendment. Determination by the Assembly of the dates referred to in this sub-paragraph and sub-paragraph (b) (iii) of this paragraph shall be by a two-thirds majority of those present and voting.

(v) The amendment shall enter into force with respect to all Contracting States [except those which before it enters into force, make a declaration that they do not accept the amendment] [provided that a Contracting State may exempt itself from giving effect to the provisions of the amendment for a period not exceeding [twelve] months from the date of entry into force of that amendment.]⁶⁷

(vi) The Assembly, by a two-thirds majority of those present and voting, including two-thirds of the States represented on the Maritime Safety Committee and present and voting in the Assembly,⁶⁸ may propose a determination that the amendment is of such an important nature that any Contracting State which, before it enters into force, makes a declaration that it does not accept an amendment and which does not accept it within a period of [twelve] months after it enters into force, shall cease to be a party to the present Convention upon the expiry of that period.⁶⁹ Such determination shall be subject to the condition that objection is not communicated to the Organization by at least one-third of the Contracting States prior to the entry into force of the amendment.⁷⁰

(vii) Notwithstanding the provisions of this sub-paragraph, the Assembly may, by a two-thirds majority⁷¹ of those present and voting, decide that any

⁶³ (i) Some delegations proposed the deletion of this sub-paragraph as well as other similar sub-paragraphs relating to amendments of an important nature.

(ii) Some delegations suggested that the latter half of this sub-paragraph should be amended to read as follows:

"... of such an important nature that if any Contracting State makes a declaration under sub-paragraph (a) (v) of this paragraph and does not accept the amendment within a period of [twelve] months after it enters into force, the other Contracting States shall not be under an obligation to extend to that State the benefits of the present Convention."

⁶⁴ (i) Some delegations questioned whether in relation to the Articles of the Convention, as opposed to the provisions of the Annexes, it would be appropriate and desirable to have a provision on the amendments of an important nature.

(ii) Some delegations also suggested that if only the second alternative in sub-paragraph (3) (a) (v) were adopted, there would be no need for a provision on amendments of an important nature.

⁶⁵ See footnote 59.

⁶⁶ One delegation suggested that this paragraph should be replaced by the text identical to that appearing in footnote 60.

⁶⁷ See footnote 61.

⁶⁸ See footnote 62.

⁶⁹ See footnote 63.

⁷⁰ Some delegations suggested that where an amendment to an Annex was considered to be of an important nature it might not be appropriate to adopt such amendment by the tacit acceptance procedure.

⁷¹ Some delegations suggested that "a two-thirds majority" should be amended to "a simple majority".

particular amendment to an Annex shall be effected by the procedures laid down in sub-paragraph (a) of this paragraph.⁷²

(viii) In the case of amendment to an optional Annex, a reference in this paragraph to a Contracting State or a party to the present Convention shall be taken to mean a reference to a party to that Annex.

(c) Amendment to Appendices to Annexes:

(i) Any amendment to an Appendix to an Annex proposed by a Contracting State shall be communicated by the Organization to all Members of the Organization and all Contracting States at least [two] months prior to the consideration by the Maritime Safety Committee.⁷³

(ii) If adopted by a two-thirds majority of those present and voting in the Maritime Safety Committee, the amendment shall be communicated to all Contracting States for acceptance.

(iii) Such amendment shall be deemed to have been accepted at the end of a period to be determined by the Maritime Safety Committee at the time of adoption of the amendment, unless within that period objection is communicated to the Organization by more than one-third of the Contracting States or by Contracting States the combined merchant fleets of which constitutes not less than [fifty] per cent of the gross tonnage of the world's merchant fleet, whichever condition is achieved.⁷⁴

(iv) The amendment deemed to have been accepted shall enter into force on the date determined by the Maritime Safety Committee at the time of adoption of the amendment. Determination by the Maritime Safety Committee of the dates referred to in this sub-paragraph (c) (iii) of this paragraph shall be by a two-thirds majority of those present and voting.

(v) The amendment shall enter into force with respect to all Contracting States [except those which before it enters into force make a declaration that they do not accept the amendment] [provided that a Contracting State may exempt itself from giving effect to the provisions of the amendment for a period not exceeding [twelve] months from the date of entry into force of that amendment.]⁷⁵

(vi) Notwithstanding the provisions of this sub-paragraph the Maritime Safety Committee may, by a majority of those present and voting decide that any particular amendment to an Appendix to an Annex shall be effected by the procedures laid down in sub-paragraph (b) of this paragraph.

(d) Addition of new Annexes:

The adoption of a new Annex shall be effected by the same procedures as are provided for in sub-paragraphs (b) (i) and (ii) of this paragraph. Such new Annex shall enter into force in accordance with the provisions stipulated in Article 16(2).

(4) Amendment by a Conference:⁷⁶

(a) The Organization may convene a Conference of Contracting States to consider amendments to the present Convention.

(b) Upon the request of a Contracting State, concurred in by at least one-third of the Contracting States, a Conference of Contracting States shall be convened by the Organization to consider amendments to the present Convention.

(c) Every amendment adopted by such a Conference by a two-thirds majority of those present and voting of the Contracting States shall be communicated by the Organization to all such States for their acceptance.

(d) Such amendment shall be brought into force in accordance with the procedures laid down for amendment after consideration in the Organization:

(i) In sub-paragraphs (3) (a) (iii)–(v) of this Regulation, in respect of amendment to the Articles;

⁷² Some delegations suggested that this sub-paragraph should be deleted as such a provision would defeat the purpose of accelerating the bringing into force of technical provisions.

⁷³ Some delegations were of the opinion that all Contracting States not being Members of the Maritime Safety Committee should be entitled to participate and vote when the amendment is considered by the Maritime Safety Committee. Doubt was, however, expressed as to whether granting to a Contracting State not being an IMCO Member the right to vote in the Maritime Safety Committee might conflict with the provisions of the IMCO Convention.

⁷⁴ See footnote 66.

⁷⁵ See footnote 61.

⁷⁶ One delegation suggested that detailed procedures for adoption and bringing into force of amendments referred to in sub-paragraphs (c)–(f) of this paragraph should be left to the Conference and therefore should be deleted.

(ii) In sub-paragraphs (3) (b) (iii)–(v) and (vii)–(viii) of this Regulation, in respect of amendment to an Annex;

(iii) In sub-paragraphs (3) (c) (iii)–(vi) of this Regulation, in respect of amendment to an Appendix to an Annex; and

(iv) In sub-paragraph (3) (d) of this Regulation, in respect of addition of a new Annex,

provided that a reference in these provisions to the Assembly or the Maritime Safety Committee shall be taken to mean a reference to the Conference.

(e) By a two-thirds majority of those present and voting, the Conference may determine at the time of its adoption that an amendment is of such an important nature that any Contracting State which, before it enters into force, makes a declaration that it does not accept the amendment and which does not accept it within a period of [twelve] months after it enters into force shall cease to be a party to the present Convention upon expiry of that period.⁷⁷

(f) In the case of an amendment to an optional Annex, a reference in this sub-paragraph to a Contracting State or a party to the present Convention shall be taken to mean a reference to a party to that Annex.

(5) The Organization shall inform all Contracting States of any amendments which enter into force under this Article, together with the date on which each such amendment enters into force.

(6) Any acceptance, declaration or objection under this Article shall be made by notification in writing to the Organization which shall notify all Contracting States of the receipt of any such notification and the date of such receipt.

ARTICLE 18.—DENUNCIATION

(1) The present Convention or any optional Annex may be denounced by any Contracting State at any time after the expiry of [five] years from the date on which the Convention or such Annex enters into force for that State.

(2) Denunciation shall be effected by the deposit of an instrument with the Organization which shall inform all the other Contracting States of any such instrument received and of the date of its receipt.

(3) A denunciation shall take effect [twelve] months, or such longer period as may be specified in the instrument of denunciation, after its receipt by the Organization.

ARTICLE 19.—TERRITORIES ⁷⁸

[(1) The United Nations, in cases where they are the administering authority for a territory or any Contracting State responsible for the international relations of a territory may at any time by notification in writing to the Organization extend the application of the present Convention to such territory.

(2) The present Convention shall, from the date of receipt of the notification or from such other date as may be specified in the notification, extend to the territory named therein.

(3) Any notification made in accordance with paragraph (1) of this Article may be withdrawn in respect of any territory mentioned in that notification and the extension of the present Convention to that territory shall cease to apply after [one] year or such longer period as may be specified at the time of the withdrawal.

(4) The Organization shall inform all the Contracting States of the notification of any extension or withdrawal of an extension communicated under this Article.]

ARTICLE 20.—DEPOSIT AND REGISTRATION

(1) The present Convention shall be deposited with the Organization and the Secretary-General of the Organization shall transmit certified true copies thereof to all Signatory States and to all States which accede to the present Convention.

(2) As soon as the present Convention enters into force, the text shall be transmitted by the Secretary-General of the Organization to the Secretariat of the United Nations for registration and publication, in accordance with Article 102 of the Charter of the United Nations.

ARTICLE 21.—LANGUAGES

The present Convention is established in a single copy in the English and French languages, both texts being equally authentic. Official translations in

⁷⁷ See footnote 63.

⁷⁸ Some delegations suggested the deletion of this Article.

the Russian and Spanish languages shall be prepared and deposited with the signed original.

In witness whereof the undersigned being duly authorized by their respective Governments for that purpose have signed the present Convention.

Done at London ----- 1973.

ANNEX I—REGULATIONS FOR THE PREVENTION OF POLLUTION BY OIL

CHAPTER I—GENERAL

REGULATION 1.—DEFINITIONS

For the purposes of this Annex:

(1) "Oil" means petroleum in any form including crude oil, residual fuel oil, sludge, oil refuse and refined products (other than petrochemicals, which are subject to the provisions of Annex II of the present Convention) and, without limiting the generality of the foregoing, includes the substances listed in Appendix I to this Annex.¹

(2) "Oily mixture" means a mixture with any oil content.

(3) "Oil fuel" is any oil used as fuel in connexion with the propulsion and auxiliary machinery of a ship.

(4) "Oil tanker" means a ship constructed or adapted primarily to carry oil in bulk in its cargo spaces, and includes combination carriers such as ore-bulk-oil and ore-oil carriers.

(5) "New ship" means a ship:

(a) For which the building contract is placed, or in the absence of a building contract,² the keel of which is laid, or which is at a similar stage of construction on or after the date of entry into force of the present Convention; or

(b) The delivery of which is [three/five]³ years or more after the date of entry into force of the present Convention; or

(c) A major conversion of which is commenced on or after the date of entry into force of the present Convention.

(6) "Existing ship" means a ship which is not a new ship.

(7) "Major conversion"⁴ means a conversion of an existing ship:

(i) Which so increases dimensions or capacities that the ship, if it were a new ship, would become subject to relevant provisions of the present Convention not applicable to it as an existing ship; or

(ii) Which changes the type of the ship; or

(iii) The intent of which in the opinion of the Administration is substantially to prolong its life.

(8) "International voyage"⁵ means a voyage from a country to which the present Convention applies to a port outside such country, or conversely; [and for this purpose every territory for the international relations of which a Contracting Government is responsible or for which the United Nations are the administering authority is regarded as a separate country.]⁶

(9) "Nearest land". The term "from the nearest land" means from the base-line from which the territorial sea of the territory in question is established [in accordance with the Geneva Convention on the Territorial Sea and the Contiguous Zone, 1958.]⁷ except that, for the purposes of the present Convention "from the nearest land" off the north eastern coast of Australia shall mean from a line drawn from a point on the coast of Australia in latitude 11° South, longitude 142°08' East to a point in latitude 10°35' South, longitude 142°55'

¹ (i) Some delegations considered that animal and vegetable oils should also be included in this definition.

(ii) Some delegations suggested that two lists be provided, one for persistent oil and the other for non-persistent oil.

² One delegation suggested that the words "in the absence of a building contract" should be deleted.

³ Of those expressing an opinion, preference was divided between three and five years.

⁴ One delegation suggested the addition of the following words: "in order to avoid compliance with the requirements of this Annex for new ships."

⁵ Some delegations considered that the examination of various Regulations might lead to the need for defining terms such as "international water" or "proceeding to the sea".

⁶ Some delegations proposed the deletion of the words within square brackets.

⁷ Some delegations proposed deletion of the reference to the 1958 Geneva Convention because that Convention is not in force for the majority of States and because its provisions may come to be modified by the UN Conference on the Law of the Sea, convened pursuant to Resolution 2750C (XXV) of the UN General Assembly.

East—thence to a point latitude 10°00' South, longitude 142°00' East, thence to a point latitude 9°10' South, longitude 143°52' East, thence to a point latitude 9°00' South, longitude 144°30' East, thence to a point latitude 13°00' South, longitude 141°00' East, thence to a point latitude 15°00' South, longitude 145°00' East, thence to a point latitude 18°00' South, longitude 147°00' East, thence to a point latitude 21°00' South, longitude 153°00' East, thence to a point on the coast of Australia in latitude 24°42' South, longitude 153°15' East.

(10) "Special area" means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to its peculiar transportation traffic the adoption of special mandatory methods for the prevention of sea pollution by oil is required. Special areas are those listed in Regulation 12 of this Annex.

(11) "Instantaneous rate of discharge of oil content" means the rate of discharge of oil in litres per hour at any instant divided by the speed of the ship in knots at the same instant.

(12) "Tank" means that part of the permanent structure of a ship which is designed for the carriage of liquid in bulk.

(13) "Wing tank" means any tank adjacent to the side shell plating.

(14) "Centre tank" means any tank inboard of a longitudinal bulkhead.

(15) "Slop tank" means a tank specifically designated for the collection of tank drainings, tank washings, sludge and other oily mixtures.

(16) "Clean ballast" means the ballast in a tank which since oil was last carried therein, has been so cleaned that effluent therefrom, if it were discharged from a stationary tanker into clean calm water on a clear day would produce no visible traces of oil on the surface of the water or on adjoining shore lines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shore lines. If the tank from which ballast is discharged is fitted with an oil content monitoring arrangement approved by the Administration, evidence based on such an arrangement to the effect that the oil content of the effluent did not exceed [15] parts per million shall be determinative that the ballast was clean, notwithstanding the presence of visible traces.

(17) "Segregated ballast" means the ballast water which is introduced into a tank or compartment permanently allocated to the carriage of ballast or cargoes other than oil and which is completely separated from the cargo oil and oil fuel system.

(18) "Length" (L) is 96 per cent of the total length on a waterline at 85 per cent of the least moulded depth measured from the top of the keel, or the length from the fore side of the stem to the axis of the rudder stock on that waterline, if that be greater.⁸ In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline. The length (L) shall be measured in metres.

(19) "Forward and after perpendiculars" shall be taken at the forward and after ends of the length (L). The forward perpendicular shall coincide with the foreside of the stem on the waterline on which the length is measured.

(20) "Amidships" is at the middle of the length (L).

(21) "Breadth" (B) is the maximum breadth of the ship, measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material. The breadth (B) shall be measured in metres.

(22) "Deadweight" (DW) means the difference between the displacement of a ship at summer load waterline and the light weight of the ship in metric tons.

(23) "Lightweight" means the displacement of a ship in metric tons without cargo, oil fuel, lubricating oil, ballast and freshwater in tanks and passengers and their effects.

(24) "Permeability" of a space means the ratio of the volume within that space which can be occupied by water to the total volume of that space.

(25) "Volumes" and "areas" shall be calculated in all cases to moulded lines.

REGULATION 2.—APPLICATION

(1) Unless expressly provided otherwise, the provisions of this Annex shall apply to all ships other than stationary ships⁹ for which only Regulation 26 of this Annex shall apply.

⁸ One delegation suggested a modification of the definition of L so as not to penalize ships with twin screws and twin rudders.

⁹ The term "stationary ships" might need to be improved. Further consideration should also be given to the implications of extending the requirements for fixed platforms to other stationary craft.

(2) In ships other than oil tankers fitted with cargo spaces which are capable of carrying oil in bulk of [200] cubic metres or above, the requirements of this Annex for oil tankers, except those of Regulations 13, 22, 23, 24 (2) and (3) and 25 shall apply to the construction and operation of those spaces.

(3) Where a cargo of noxious substances other than oil which are subject to the provisions of Annex II of the present Convention is carried in a cargo space of an oil tanker, the appropriate requirements of Annex II of the present Convention shall apply.

(4) (a) Any hydrofoil, air-cushion vehicle and similar high speed craft¹⁰ whose constructional features are such as to render the application of any of the provisions of Chapters II and III of this annex relating to the construction and equipment unreasonable or impracticable may be exempted by the Administration from such provisions, provided that the Administration is satisfied that the construction and equipment of that ship provides equivalent protection for the prevention of pollution by oil, having regard to the service for which it is intended, and that they are acceptable to the Governments of the States to be visited by the ship.

(b) Particulars of any such exemption granted by the Administration shall be indicated in the Certificate referred to in Regulation 5 of this Annex.

(c) The Administration which allows any such exemption shall communicate to the Organization particulars of same and the reasons therefor, which the Organization shall circulate to the Contracting Governments for their information.

REGULATION 3.—EQUIVALENTS

(1) The Administration may allow any fitting, material, appliance or apparatus, to be fitted, or any other provision to be made in a ship, other than that required by this Annex if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or provision, is at least as effective as that required by this Annex.

(2) The Administration which allows a fitting, material, appliance or apparatus, or provision, other than that required by this Annex shall communicate to the Organization for circulation to the Contracting Governments particulars thereof, together with a report of any trials made.

REGULATION 4.—INSPECTION AND SURVEY

(1) oil tanker of [150] tons gross tonnage and above, and every other ship of [400] tons gross tonnage and above shall be subject to the surveys and inspections specified below:

(a) A survey before the ship is put in service or before the certificate required under Regulation 5 of this Annex is issued for the first time, which shall include a complete inspection of its structure and equipment in so far as the ship is covered by this Annex. This survey shall be such as to ensure that the arrangements and material fully comply with the applicable requirements of this Annex.

(b) A periodical survey at intervals specified by the Administration, but not exceeding five years which shall be such as to ensure that the structure, equipment arrangements and material fully comply with the applicable requirements of this Annex.

(c) A periodical inspection at intervals specified by the Administration, but not exceeding two years,¹¹ which shall be such as to ensure that the equipment and associated pumps and pipings, including oil discharge monitoring and control systems, fully comply with the applicable requirements of this Annex and is in good working order. Some periodical inspection shall be endorsed on the International Oil Pollution Prevention Certificate (1973) issued under Regulation 5 of this Annex.

(2) The Administration shall establish appropriate measures for ships which are not subjected to the provisions of paragraph (1) of this Regulation in order to ensure that the provisions of this Annex are complied with.

(3) The survey and inspection of the ship as regards enforcement of the provisions of this Annex shall be carried out by officers of the Administration. The Administration may, however, entrust the survey and inspection either to surveyors nominated for the purpose or to organizations recognized by it. In

¹⁰ Consideration should be given to developing a more suitable text for defining novel type of craft.

¹¹ Some delegations suggested that a two-month extension of the date of periodical inspection should be granted.

every case the Administration concerned fully guarantees the completeness and efficiency of the survey and inspection.

(4) After any survey of the ship under this Regulation has been completed, no change shall be made in the structure, equipment, arrangements or material covered by the survey without the sanction of the Administration, except the direct replacement of such equipment.

REGULATION 5.—ISSUE OF CERTIFICATE

(1) An International Oil Pollution Prevention Certificate (1973) shall be issued to any oil tanker of [150] tons gross tonnage and above and any other ships of [400] tons gross tonnage and above which are engaged on international voyages, after survey to such ship in accordance with the provisions of Regulation 4 of this Annex.

(2) Such Certificate shall be issued either by the Administration or by any persons or organization duly authorized by it. In every case the Administration assumes full responsibility for the certificate.

REGULATION 6.—ISSUE OF A CERTIFICATE BY ANOTHER GOVERNMENT

(1) A Contracting Government may, at the request of another Contracting Government, cause a ship to be surveyed and, if satisfied that the provisions of this Annex are complied with, shall issue or authorize the issue of an International Oil Pollution Prevention Certificate (1973) to the ship in accordance with this Annex.

(2) A copy of the certificate and a copy of the survey report shall be transmitted as early as possible to the requesting Government.

(3) A certificate so issued shall contain a statement to the effect that it has been issued at the request of the Government of the State whose flag the ship is entitled to fly, and it shall have the same force and receive the same recognition as the certificate issued under Regulation 5 of this Annex.

(4) No International Oil Pollution Prevention Certificate (1973) shall be issued to a ship which is entitled to fly the flag of a State the Government of which is not a Contracting Government.

REGULATION 7.—FORM OF CERTIFICATES

(1) The Certificate shall be drawn up in the official language or languages of the issuing country. If the language used is neither English nor French, the text shall include a translation into one of these languages.

(2) The forms of the Certificates to be issued to oil tankers and to ships other than oil tankers shall correspond to those of the models given in Parts A and B of Appendix II to this Annex respectively.

REGULATION 8.—DURATION AND CANCELLATION OF CERTIFICATES

(1) An International Oil Pollution Prevention Certificate (1973) shall be issued for a period specified by the Administration, which shall not exceed five years from the date of issue.

(2) If, after the periodical survey referred to in Regulation 4(1)(b) of this Annex, a new Certificate cannot be issued to the ship before the expiry of the certificate originally issued, the person or organization carrying out the survey may extend the validity of the original Certificate for a period of which shall not exceed five months. This extension shall be endorsed on the Certificate, and shall be granted only where there have been no alterations in the structure, equipment and arrangements.¹²

(3) A Certificate shall cease to be valid if alterations have taken place in the arrangement, construction, equipment and material required without the sanction of the Administration, except the direct replacement of such equipment, and shall be cancelled by the Administration.

(4) A Certificate issued to a ship by the Administration shall cease to be valid upon transfer of such a ship to the flag of another State, except as provided in paragraph (5) of this Regulation.

(5) Upon transfer of a ship to the flag of another State, the Government of which is a Contracting Government, the International Oil Pollution Prevention

¹² One delegation suggested that the wording similar to Regulation 14 of Chapter I of the 1960 Safety Convention should be used in lieu of the wording of the 1966 Load Line Convention used in the existing text.

Certificate (1973) shall remain in force for a period not exceeding three months or until the Administration issues another International Oil Pollution Prevention Certificate (1973) to replace the former, whichever is earlier. The Contracting Government of the State whose flag the ship was entitled to fly hitherto shall transmit to the Administration as soon as possible after the transfer takes place a copy of the Certificate carried by the ship at the time of transfer.

[*Regulation . . .—Reports on Incidents Involving Significant Spillages of Oil*]¹³

CHAPTER II—REQUIREMENTS FOR CONTROL OF OPERATIONAL POLLUTION

REGULATION 9.—CONTROL OF DISCHARGE OF OIL¹⁴

(1) Subject to the provisions of Regulation 10 of this Annex,¹⁵ any discharge into the sea of oil or oily mixtures from ships to which this Annex applies shall be prohibited except when all the following conditions are satisfied:

(a) For an oil tanker:

(i) The tanker is proceeding en route;

(ii) The tanker is more than [50]¹⁶ nautical miles from the nearest land;

(iii) The tanker is not within any of the areas defined in Regulation 1(10) of this Annex;

(iv) The instantaneous rate of discharge of oil content does not exceed [60] litres per nautical mile;

(v) The total quantity of oil discharged into the sea which may be permitted only during the first or second voyages following unloading of the cargo¹⁷ shall not exceed:

(1) For the new tankers¹⁸ of less than [100,000] tons deadweight and for existing tankers¹⁸ [1/15,000]¹⁹ of the total quantity of the cargo which the residue formed a part; and

(2) For new tankers¹⁸ of [100,000] tons deadweight or more, [1/30,000]¹⁹ of the total quantity of the cargo of which the residue formed a part;

(iv) The tanker has in operation an oil discharge monitoring and control system required by Regulation 15 of this Annex;

(vii) The tanker has in operation a slop tank arrangement required by Regulation 15 of this Annex

The discharge of oil or oily mixture, other than mixture equivalent to clean ballast, from machinery space bilges, excluding cargo pump room bilges, shall be governed by sub-paragraph (b) of this paragraph;

(b) For a ship other than an oil tanker:

(i) The ship is proceeding en route;

(ii) The oil content of the discharge is less than [100] parts of oil per 1,000,000 parts of effluent;

(iii) the instantaneous rate of discharge of oil content does not exceed [60] litres per nautical mile;

¹³ Depending on the final text of Article 7 to be adopted by the Conference, there might be a need to include appropriate requirements in this Annex.

¹⁴ There was a reasonable division of opinion among delegations on the need to develop special requirements under this Regulation for non-persistent oil. A proposed approach of dealing with this matter submitted by several delegations is shown on page 92 of this document as an addendum to this footnote. Time did not permit examination of this proposal in any depth.

¹⁵ Some delegations suggested the insertion of the following words at the beginning of the paragraph:

"Without prejudice to more stringent regulations which a coastal State may make [within the limits of national jurisdiction /in respect of areas under its jurisdiction/ in respect of waters under its jurisdiction]."

¹⁶ Some delegations considered that it would be desirable to revise the various figures shown in brackets in this Regulation, since in their view technical advances make possible a significant reduction in the amount of oil being discharged from ships and a greater "distance from land" requirement would represent reasonable tightening of the 1969 Amendments requirements. These delegations further suggested substitution of the following figures for those in square brackets in this Regulation, believing these figures to be technically achievable and highly desirable with respect to the protection of the marine environment: 100 nautical miles in sub-paragraph (1)(a)(ii) and 30 litres per nautical mile in sub-paragraphs (1)(a)(v) and (1)(b)(iii).

¹⁷ The wording "during the first and second voyages following unloading of the cargo" would require improvement to cover all eventualities.

¹⁸ Some delegations proposed that there should be no distinction of the maximum quantity as between new and existing ships.

¹⁹ One delegation considered that the figures shown in the text would create an anomaly as between ships slightly below and above 100,000 tons deadweight and therefore an interpolation formula should be used.

(iv) The discharge is made as far as practicable from the land, but in no case less than [10] nautical miles from the nearest land ²⁰;

(v) The ship, if of [———] tons gross tonnage or above, is not within any of the areas defined in Regulation 1(10) of this Annex;

(vi) The ship has in operation an oil discharge monitoring and control system or oily water separating equipment or other installation as required by Regulation 16 of this Annex.

(2) Ships, while operating in special areas defined in Regulation 1(10) of this Annex shall be subject to appropriate requirements of Regulation 12 of this Annex.

(3) [———] ²¹

(4) The discharge shall not contain chemicals or other substances which are hazardous to the marine environment. The discharge shall not contain chemicals or other substances introduced for the purpose of circumventing the conditions of discharge specified in this Regulation.

(5) The provisions of sub-paragraph (1)(a) of this Regulation shall not apply to the discharge of clean or segregated ballast provided that any such discharge which has been contaminated with oil to a level above that which would be permitted as clean ballast shall be treated as oily mixture and shall comply with the provisions of paragraph (1) of this Regulation.

REGULATION 10.—EXCEPTION

Regulation 9 of this Annex shall not apply to:

(a) the discharge of oil or oily mixture from a ship necessary for the purpose of securing the safety of a ship or saving life at sea; or

(b) the escape of oil or oily mixture resulting from damage to a ship or its equipment, if all reasonable precautions have been taken after the occurrence of the damage or discovery of the leakage for the purpose of preventing or minimizing the escape; or

(c) the discharge into the sea of substances containing oil, approved by the Administration, when being used as dispersants for the purpose of combating specific pollution incidents in order to minimize the damage from pollution.

²⁰ Several delegations suggested that exemption should be granted from the [10] nautical mile requirement in the case of small ships such as those less than [400] tons gross tonnage or those which are engaged only on coastal voyages.

²¹ There was unanimous agreement among the delegations that it would be desirable to include a provision facilitating enforcement of paragraphs (1) and (2) of this Regulation, provided that such a provision could be cast in terms compatible with the various legal systems in Contracting States. It was therefore determined that a paragraph in the draft Annex should be reserved for such a provision. However, no agreement was reached on the legal principles to form the basis of such a provision. It was agreed that this matter should be studied by interested Governments prior to the Conference, so that an informed decision can be made at that time. The following provisions were submitted by various delegations for consideration by interested Governments:

(i) Evidence of visible traces of oil on or below the surface of the water in the vicinity of a ship or its wake shall be cause for investigation by appropriate officials of Contracting States of all relevant facts, including wind and sea conditions and the track and speed of the ship, bearing on the issue of whether there has been a violation of the provisions of this Regulation or Regulation 12 of this Annex, as applicable. If on the basis of the facts developed in the investigation, the visible traces can reasonably be attributed to a discharge from that ship, evidence of such traces and facts shall [solely for the purpose of imposing monetary penalties] be sufficient to establish a violation of this Regulation or Regulation 12 of this Annex, as applicable, unless probative evidence is presented that the ship did not discharge oil or that any discharge of oil did not violate the provisions of this Regulation or Regulation 12.

(ii) Modify the text in (i) above by inserting between the first and second sentences the following: "Any Contracting State may adopt the following rule of evidence:"

(iii) If it is proven that oil, making visible traces on or below the surface of the water in the vicinity of a ship or its wake, has been discharged from that ship, a violation of this Regulation or Regulation 12 of this Annex, as applicable, shall be deemed to have been committed, unless probative evidence is presented that the discharge of oil did not violate the provisions of this Regulation or Regulation 12.

(iv) Evidence of visible traces of oil on or below the surface of the water in the vicinity of the ship or its wake which, taking into account existing wind and sea conditions and the track and speed of the ship, may reasonably be attributed to a discharge from that ship, shall be evidence sufficient to establish a violation of this Regulation or Regulation 12 of this Annex, as applicable unless probative evidence is presented that the ship did not discharge oil or that any discharge of oil did not violate the provisions of this Regulation or Regulation 12.

REGULATION 11.—METHODS TO EFFECT THE CONTROL OF DISCHARGE OF OIL FROM
OIL TANKERS

(1) ²² Every oil tanker shall operate under such methods as appropriate to comply with the discharge criteria specified in Regulation 9 of this Annex. To this end the following operating methods shall apply, subject to the provisions of paragraphs (2) and (3) of this Regulation and Regulation 12 of this Annex:

- (a) Segregated ballast tanks specified in Regulation 13 of this Annex;
- (b) Retention of oil on board specified in Regulation 15 of this Annex;
- (c) In-port disposal to shore-reception facilities specified in Regulation 20 of this Annex.

(2) ²³ Every oil tanker (excluding combination carriers) of [150,000] tons deadweight and above and every combination carrier of [100,000] tons deadweight and above, for which the building contract is placed on or after [1 January 1978] ²⁴ or in the absence of a building contract ²⁵ the keel of which is laid or which is at a similar stage of construction on or after [1 January 1980] ²⁴ or the delivery of which is on or after [1 January 1981] ²⁴, shall be designed, constructed and equipped in compliance with the requirements of Regulation 13 of this Annex. ²⁶

(3) As from the date of the entry into force of the present Convention every oil tanker shall be capable of operating under both the methods specified in sub-paragraphs (1)(b) and (1)(c) of this Regulation to the standards and requirements of Regulation 9(1)(a) of this Annex, except for the requirements of Regulation 9(1)(a)(vi) and 9(1)(a)(vii) of this Annex which shall be provided before the expiry of a period of [2] years from that date.

REGULATION 12.—METHODS FOR THE PREVENTION OF OIL POLLUTION FROM OIL
TANKERS WHILE OPERATING IN SPECIAL AREAS

(1) *Special Areas:*

(a) For the purposes of this Annex special areas shall include the Mediterranean Sea, Baltic Sea and Black Sea.

(b) Each Contracting Government of a State, the coastline of which borders on any of the special areas defined in Regulation 1(10) of this Annex, shall take appropriate measures in order to achieve the earliest adoption of the following methods for preventing oil pollution in respect of areas under its jurisdiction ²⁷

(c) Every oil tanker while operating in any special area, as defined in Regulation 1(10) of this Annex and listed in sub-paragraph (a) of this paragraph, shall be subject to the applicable provisions of this Regulation.

(2) *The Mediterranean Sea:* ²⁸

The oil pollution prevention by oil tankers in the Mediterranean Sea, recognized as a special area, will be effected as follows:

(a) oil tankers, while operating in the Mediterranean Sea, shall retain on board all oil drainage and sludge, dirty ballast and tank washing waters and, [if proceeding to oil loading terminals, repair ports, and sea water courses with a low depth contour which may require ballast lightening], and shall discharge them only to shore reception facilities to be provided [there], as appropriate, by Contracting Governments.

²² Depending on the decisions by the Conference on Regulation 9 relating to a possible inclusion of special discharge criteria for non-persistent oil, this paragraph might require modification (see Footnote 14 under Regulation 9).

²³ Several delegations were of the opinion that there should be no mandatory requirements for segregated ballast tankers and therefore the paragraph should be deleted.

²⁴ Some delegations were of the opinion that the dates should be 1 January 1976, 1 January 1976 and 1 January 1979 respectively. The United States stated that the dates indicated in the draft would fail to meet the objectives of the Conference decided by the Assembly Resolution A.237(VII) and Recommendation 92 of the Stockholm Conference.

²⁵ Some delegations suggested the deletion of the words "or the absence of a building contract".

²⁶ Some delegations suggested that further consideration should be given to the possible inclusion of wording such as "This requirement shall not apply to oil tankers which do not normally carry water ballast in their cargo tanks and which in their particular route and due to their design have the facility to dispose of their dirty ballast, tank washings and sludge in accordance with the discharge criteria and those operating in special areas."

²⁷ It was recognized that the words "under its jurisdiction" were inappropriate and would require revision. In this connexion one delegation suggested the following alternative wording:

"(b) Each Contracting Government of a State, the coastline of which borders on any of the special areas defined in Regulation 1(10) of this Annex, shall take appropriate measures within its jurisdiction to achieve the earliest adoption of the following methods for preventing oil pollution."

²⁸ Some delegations were of the opinion that there should be one single set of requirements for all the special areas listed in sub-paragraph (1)(a) of this Regulation.

(b) Each Contracting Government, not later than [1 January 1977], shall provide every oil loading terminal, repair ports and entrances to sea water courses with a low depth contour under its jurisdiction,²⁷ located in the Mediterranean Sea, with facilities adequate for the reception and treatment of all the dirty ballast and tank washings waters from tankers.

During the period between the entry into force of the present Convention (if earlier than [1 January 1977]) and [1 January 1977] oil tankers, while navigating in the Mediterranean Sea, shall comply with the requirements of Regulation 13 of this Annex. After [1 January 1977] oil tankers loading in the Mediterranean ports, where such facilities are not yet available, shall comply with the requirements of Regulation 11 of this Annex until such facilities become available.

(c) After 1 January 1977 each Contracting Government shall report to the Organization for transmission to the Contracting Governments concerned all cases where the facilities are alleged to be inadequate.²⁹

- (3) *Baltic Sea* } [to be prepared]³⁰
 (4) *Black Sea* }

REGULATION 13.—SEGREGATED BALLAST OIL TANKERS

(1) Oil tankers provided with segregated ballast tanks in accordance with paragraph (2) of Regulation 11 of this Annex shall comply with the requirements of this Regulation.^{31 32}

(2) The capacity of the segregated ballast tanks shall be so determined that the ship may operate safely on ballast voyages under weather and sea conditions it may normally be expected to encounter having regard to its draught, freeboard, stability and maneuverability without recourse to the use of oil tanks for water ballast.³³

(3) The capacity of the segregated ballast tanks shall be such as to achieve in the ballast condition a minimum forward draught of [0.025L]³⁴ and an after draught to ensure adequate propeller and rudder immersion provided that:

- (a) the provisions of paragraph (2) of this Regulation are met; and

²⁹ Consideration should be given to the inclusion of an additional paragraph on similar lines to Regulation 20(2). This might include an obligation on Contracting Governments to furnish information to the Organization and keep it up to date on the facilities available in their loading terminals and repair ports. This provision might be included in paragraph (2) (c) of this Regulation or elsewhere in the Convention, perhaps in Article 11 (see footnote 48 under that Article).

³⁰ It was noted that preparatory work was being carried out by coastal states concerned on proposals for the Baltic Sea which might be submitted to the Conference.

³¹ One delegation expressed the view that segregated ballast capacity for oil tankers trading solely within [150] miles between oil loading and oil delivering terminals should be left to the option of the Administration. The segregated ballast capacity and operational range to be indicated on the corresponding certificate.

³² One delegation expressed the view that oil tankers applying solely the in-port disposal system as referred to in Regulation 11(1) (c) should be exempt from any requirement for segregated ballast. Such an exemption to be indicated on the corresponding certificate.

³³ (i) Several delegations were in favour of specifying double bottom construction as an anti-pollution measure in the event of stranding by adding the following sentence. "This segregated ballast capacity shall be achieved in part by fitting throughout the cargo length a double bottom height of at least B/15".

(ii) One delegation proposed the height of double bottom be deduced to B/21 if the tanker is fitted with a double skin throughout the cargo length.

(iii) One delegation suggested that this sentence, if incorporated, should be included in Chapter III of this Annex as it would relate primarily to the minimization of accidental spills.

³⁴ These values are based upon classification society rules and present tanker practices. They do not reflect any experience or features of segregated ballast designs. Consideration should be given to the acceptance of a formula which would require draughts equal to lower percentages of length for large tankers and higher percentages of length for smaller tankers.

[(b)³⁵(i) in oil tankers and combination carriers between 150,000 tons deadweight and 500,000 tons deadweight, the draught shall be such as to correspond to not less than [45] per cent and [30] per cent of the full load displacement respectively. (Intermediate values to be linearly interpolated.)

(ii) in combination carriers between 100,000 tons deadweight and 150,000 tons deadweight the draught shall be such as to correspond to not less than [45] per cent of the full load displacement.

(iii) in oil tankers and combination carriers greater than 500,000 tons deadweight, the draught shall be such as to correspond to not less than [30] per cent of the full load displacement.]

(4) Any oil tanker which is not subject to the provisions of Regulation 11(2) of this Annex shall be qualified as a segregated ballast tanker referred to in Regulation 11(1)(a) of this Annex provided that it complies fully with the requirements of paragraphs (1), (2) and according to the size, paragraph (3) of this Regulation or the following: In oil tankers (excluding combination carriers) less than [150,000] tons deadweight and combination carriers less than [100,000] tons deadweight, the capacity of the segregated ballast tanks shall be such as to achieve in the ballast condition a minimum forward draught of [0.025L]³⁴ and an after draught to ensure adequate propeller and rudder immersion provided that:

(a) the provisions of paragraph (2) of this Regulation are met; and

[(b)³⁵ in no case will the draught be such as to correspond to a ballast displacement less than [45] per cent of the full load displacement.]

(5) Where abnormally severe weather conditions render it necessary to carry additional water ballast in oil tanks, such ballast water shall be processed and disposed of in accordance with the requirements of Regulation 15 of this Annex, and entry shall be made in the Oil Record Book referred to in Regulation 21 of this Annex.³⁶

REGULATION 14.—SEGREGATION OF OIL AND WATER BALLAST IN SHIPS OTHER THAN OIL TANKERS

(1) In new ships, other than oil tankers, of not less than [4,000] tons gross tonnage, no ballast water shall be carried in any oil fuel tank or in any cargo tank which has not been cleaned in compliance with the provisions of Regulation 1(16) of this Annex.

(2) Where abnormal conditions render it necessary to carry ballast water in any oil fuel tank or in any cargo deep tank which has not been cleaned in compliance with the provisions of Regulation 1(16) of this Annex, such ballast water shall be disposed of in shore reception facilities or in accordance with the requirements of Regulation 9(b) of this Annex, and an entry shall be made in the [Oil Record Book].

(3) Except for oil tankers, new ships of less than [4,000] tons gross tonnage and all existing ships shall comply with the requirements of paragraphs (1) and (2) of this Regulation as far as reasonable and practicable.

³⁵ The problem with specifying minimum ballast draught levels solely as a function of a principal dimension such as length would encourage the development of vessels of unusual proportions, *not* for operating reasons, but to circumvent the need to provide adequate segregated ballast capacity, i.e. "paragraph ships". Admittedly, calling out minimum ballast levels as a function of displacement or deadweight has its pitfalls. It is also admitted that to perhaps be able to call out the segregated ballast level simply in terms of draught would be optimum but only if one can develop a required ballast draught as a function of certain parameters or combinations thereof, *without* giving incentive to minimize segregated levels below those considered necessary. For example it may be the ballast draught can be expressed in terms of such parameters as L/D, L/d, propeller diameter divided by draught, etc. such that the development of "paragraph ships" can be obviated. This development remains to be done.

³⁶ Some delegations suggested that provisions should be included in this Regulation for sealing the valves for ballast water pipes to cargo oil tanks, so that whenever these valves were used to carry additional ballast in cargo oil tanks in exceptional circumstances, the broken seals may be taken as an indication that such cargo oil tanks had contained the ballast water contaminated with oil.

REGULATION 15.—RETENTION OF OIL ON BOARD

(1) Where it is intended that the control of discharge of oil under Regulation 11 of this Annex shall be effected by the retention of slops and tank washings on board, oil tankers of [150] tons gross tonnage and above shall be provided with arrangements in accordance with the requirements of this Regulation.

(2) The ship shall be provided with adequate means for cleaning the cargo tanks and with means for the transference of the dirty oil ballast residue and washings from the cargo tanks into a slop tank or reception tank approved by the Administration.

(3) (a) In this system arrangements shall be provided to transfer the oily waste into a slop tank or combination of slop tanks in such a way that the oil content of any effluent is such as to comply with the provisions of Regulation 9 of this Annex.

(b) The arrangements of the slop tank or combination of slop tanks shall have a capacity necessary to retain the slops generated by the tank washings and dirty oil ballast residue but the total shall be not less than [3] per cent of the oil carrying capacity of the ship, except that, where arrangements involving the use of additional water, such as eductors, are not fitted the Administration may accept [2] per cent. Oil tanks over [100,000] tons deadweight shall be provided with at least two slop tanks.

(c) Slop tanks shall be so designed particularly in respect of the position of inlets, outlets, baffles or weirs where fitted, so as to avoid excessive turbulence and entrainment of oil or emulsion with the water.

(d) The tanker shall be fitted with an [automatic] oil content monitoring arrangement³⁷ approved by the Administration to check the quality of any effluent discharged to the sea in the "once through system" or decanted from any cargo tank, slop tank or reception tank in which ballast water or tank washings are allowed to settle either when the recirculatory system is used or when the discharge of residue ashore is intended. [The meter shall be fitted with a recording device to provide a permanent record of the oil content of the discharge.]

(e) An efficient and effective oil/water interface detector approved by the Administration shall be provided for a rapid and accurate determination of the oil/water interface.

(f) The operation of this system shall be in accordance with an operational manual approved by the Administration and intended to ensure that at no time shall oil be discharged except in compliance with the conditions specified in Regulation 9 of this Annex.

(4) Where it is intended that the control of discharge of oil under Regulation 11 of this Annex shall be effected by the retention of oil on board with subsequent discharge to shore of all contaminated washings, the total quantity of oil and water used for washing and returned to a storage tank shall be recorded in the Oil Record Book. This total quantity shall be discharged to the shore unless adequate arrangements are made to ensure that any settled water which is allowed to run to the sea is effectively monitored to ensure that the provisions of Regulation 9 of this Annex are complied with.

REGULATION 16.—OIL DISCHARGE MONITORING SYSTEM AND OILY WATER SEPARATING EQUIPMENT IN SHIPS OTHER THAN OIL TANKERS

(1) Any ship of [10,000]³⁸ tons gross tonnage and above shall be fitted with an oil discharge monitoring system to comply with the provisions of paragraph (5) of this Regulation.³⁹

(2) Any ship of [400] tons gross tonnage and above shall be fitted with an oily water separating or filtering system complying with the provisions of paragraph (4) of this Regulation.

(3) The Administration shall ensure that ships of less than [400] tons gross tonnage are equipped with installations, as far as practicable, in order to retain on board or discharge oil or oily mixture in accordance with the requirements of Regulation 9(1) (b) of this Annex.⁴⁰

(4) An oily water separating system shall be of a design approved by the Administration and shall be such as will ensure that any oily mixture discharged

³⁷ One delegation suggested that a visual indicator should additionally be required.

³⁸ Views on the size limitations were widely divided.

³⁹ Some delegations expressed doubts on the need to include this paragraph.

⁴⁰ Some delegations pointed out this paragraph would need improvement as the requirements do not appear fully compatible with Regulation 9(1) (b).

into the sea after passing through the separator shall have an oil content of not more than 100 parts per million. In considering the design of such equipment, the Administration shall have regard to the specification set out in Part A of the Recommendation annexed to Resolution A.233(VII) adopted by the Assembly of the Organization.

(5) An oil discharge monitoring [and control] system shall be of a design approved by the Administration and shall be such as will ensure that the discharge of oily mixture is automatically stopped when the discharged mixture contains 100 parts per million or more of oil. In considering the design of the oil content meter that is to be incorporated into the design of such a system the Administration shall have regard to the specification set out in Part B of the Recommendation annexed to Resolution A.233(VII) adopted by the Assembly of the Organization. [The meter shall be fitted with a recording device to provide a permanent record of the oil content of the discharge.]

REGULATION 17.—TANKS FOR OIL RESIDUES (SLUDGE)

Every ship of [400] tons gross tonnage and above⁴¹ shall be provided with tank or tanks of adequate capacity, having regard to the type of machinery and length of voyage, to receive the only residues (sludges) resulting from the purification of fuel and lubricating oils and oil leakages in the machinery spaces. For all new ships, and insofar as is reasonable and practicable, for all existing ships, such tanks shall be designed and constructed so as to facilitate their cleaning and discharge of residues to reception facilities.

REGULATION 18.—PUMPING AND PIPING ARRANGEMENTS OF OIL TANKERS FOR THE DISCHARGE TO RECEPTION FACILITIES OR TO THE SEA

(1) In every oil tanker, pipelines for the discharge of dirty water ballast and/or oil contaminated water to shore or floating reception facilities shall be led to the open deck on both sides of the ship.

(2) In every oil tanker, pipelines for the discharge to the sea of effluent which may be permitted under Regulation 9 of this Annex shall be led to the open deck or to the ship's side above the waterline in the heaviest ballast condition.

(3) In [new]⁴² oil tankers remote control of the pumps for discharge pipes referred to in paragraphs (1) and (2) of this Regulation shall be provided at a position where the discharge pipes are under visual supervision.

REGULATION 19.—STANDARD SHORE CONNECTION

To enable pipes of shore reception facilities to be connected with the ship's pipe discharge line for residues from machinery bilges, both lines shall be fitted with a standard shore connection in accordance with the following table:

Standard dimensions of flanges for discharge pipes

<i>Description</i>	<i>Dimension</i>
Outside diameter -----	215 mm
Inner diameter -----	According to pipe outside diameter
Bolt circle diameter -----	183 mm
Slots in flange -----	6 holes 22 mm in diameter equidistantly placed on a bolt circle of the above diameter, slotted to the flange periphery. The slot width to be 22 mm
Flange thickness -----	20 mm
Bolts and nuts: quantity, diameter---	6, each of 20 mm in diameter and of suitable length

(The flange is designed to accept pipes up to a maximum internal diameter of 125 mm and shall be of steel or other equivalent material having a flat face. This flange, together with a gasket of oilproof material, shall be suitable for a service pressure of 6 kg/cm².)

⁴¹ Some delegations suggested the use of horsepower of the propelling machinery in lieu of gross tonnage.

⁴² Some delegations considered that this requirement should apply to new and existing ships.

REGULATION 20.—RECEPTION FACILITIES

(1) Each Contracting Government shall take appropriate steps to ensure the provision of facilities at oil terminals and in other ports in which ships have oily residues to discharge for the reception of such residues and oily mixtures as remain for disposal from oil tankers and other ships without causing undue delay to ships and according to the needs of the ships using them.

(2) Each Contracting Government shall determine to which of its ports and oil terminals paragraph (1) of this Regulation shall apply.

(3) As regards paragraph (1) of this Regulation each Contracting Government shall report to the Organization for transmission to the Contracting Governments concerned all cases where the facilities are alleged to be inadequate.

REGULATION 21.—OIL RECORD BOOK

(1) Every oil tanker of [150] tons gross tonnage and above and every ship other than oil tankers, of [400] tons gross tonnage and above⁴³ shall be provided with an Oil Record Book, whether as part of the ship's official log book or otherwise, in the form specified in Appendix III of this Annex.

(2) The Oil Record Book shall be completed on each occasion, on a tank-to-tank basis, whenever any of the following operations take place in the ship:

(a) *For oil tankers:*

(i) loading of oil cargo;

[(ii) transfer of oil cargo during voyage;]

[(iii) opening of the sluice valves at the cargo tank bulkheads at the loading terminals;]

(iv) discharge of oil cargo;

[(v) closing of the sluice valves at the cargo bulkheads at the loading terminals;]

(vi) ballasting of cargo tanks;

(vii) cleaning of cargo tanks;

(viii) discharge of ballast except from segregated ballast tanks;

(ix) discharge of water from slop tanks;

[(x) disposal of residues];

(xi) discharge overboard of bilge water which has accumulated in machinery spaces whilst in port, and the routine discharge at sea of bilge water which has accumulated in machinery spaces.

(b) *For ships other than oil tankers:*

[(i) ballasting or cleaning of bunker tanks or oil cargo spaces;

(ii) discharge of ballast or cleaning water from tanks referred to under (i) of this subparagraph;

(iii) disposal of residues];

(iv) discharge overboard of bilge water which has accumulated in machinery spaces whilst in port, and the routine discharge at sea of bilge water which has accumulated in machinery spaces.

(3) In the event of such discharge or escape of oil or oily mixture as is referred to in Regulation 12 of this Annex, a Statement shall be made in the Oil Record Book of the circumstances of, and the reasons for, the discharge or escape.

(4) Each operation described in paragraph (2) of this Regulation shall be fully recorded without delay in the Oil Record Book so that all the entries in the book appropriate to that operation are completed. Each page of the book shall be signed by the officer or officers in charge of the operations concerned and when the ship is manned, by the master of the ship. The written entries in the Oil Record Book shall be in an official language of the State the flag of which the ship is entitled to fly and "in English or French"⁴⁵.

⁴³ Some delegations suggested that for smaller ships some simplified form for oil records should be provided by means of either a simplified Oil Record Book, special entries in the log book or other appropriate means decided by the Administration.

⁴⁴ Some delegations suggested the use of the word "or" in lieu of "and". Other delegations suggested that the entry in the Oil Record Book should be either English or French, or the national language and English or French.

⁴⁵ Some delegations considered that this requirement should apply to ships above a certain size which may be either gross tonnage or deadweight. Other delegations considered that this requirement should apply to ships engaged on international voyages.

(5) Oil Record Books shall be kept in such a place as to be readily available for inspection at all reasonable times and, except in the case of unmanned ships under tow, shall be kept on board the ship. They shall be preserved for a period of two years after the last entry has been made.

(6) The competent authorities of a Contracting Government may inspect on board any ship to which the present Convention applies while within a port or at any loading terminal under its jurisdiction the Oil Record Book required to be carried in the ship in compliance with the provisions of this Regulation, and may make a true copy of any entry in that book and may require the master of the ship to certify that the copy is a true copy of such entry. Any copy so made which purports to have been certified by the master of the ship as a true copy of an entry in the ship's Oil Record Book shall be made admissible in any judicial proceedings as evidence of the facts stated in the entry. Any action by the competent authorities under this paragraph shall be taken as expeditiously as possible and the ship shall not be unduly delayed.

CHAPTER III—REQUIREMENTS FOR MINIMIZING OIL POLLUTION FROM OIL TANKERS DUE TO SIDE AND BOTTOM DAMAGES

REGULATION 22.—DAMAGE ASSUMPTIONS

For the purpose of calculating hypothetical oil outflow from oil tankers, three dimensions of the extent of damage of a parallelepiped on the side and bottom of the ship are assumed as follows. In the case of bottom damages two conditions are set forth to be applied individually to the stated portions of the oil tanker.

(a) *Side damage:*

- (i) Longitudinal extent (l_c): $\frac{1}{3}L^{2/3}$ or 14.5 metres, whichever is less.
- (ii) Transverse extent (t_c): $B/5$ or 11.5 metres, whichever is less.
(Inboard from the ship's side at right angles to the centreline at the level of the summer load line.)
- (iii) Vertical extent (v_c): from the base line upwards without limit.

(b) *Bottom damage:* For $0.3L$ from the forward perpendicular of ship; any other part of ship.

- (i) Longitudinal extent (l_s): $L/10$; $L/10$ or 5 metres, whichever is less.
- (ii) Transverse extent (t_s): $B/6$ or 10 metres, whichever is less but not less than 5 metres; 5 metres.
- (iii) Vertical extent from the base line (v_s): $B/15$ or 6 metres, whichever is less.

REGULATION 23.—HYPOTHETICAL OUTFLOW OF OIL

(1) The hypothetical outflow of oil in the case of side damage (O_c) and bottom damage (O_s) shall be calculated by the following formulae with respect to compartments breached by damage to all conceivable locations along the length of the ship to the extent as defined in Regulation 22 of this Annex.

(a) for side damages:

$$O_c = \sum W_i + \sum K_i C_i \quad (\text{I})$$

(b) for bottom damages:

$$O_s = \frac{1}{3}(\sum Z_i W_i + \sum Z_i C_i) \quad (\text{II})$$

where:

W_i =volume of a wing tank in cubic metres assumed to be breached by the damage as specified in Regulation 22 of this Annex; W_i for a segregated ballast tank may be taken equal to zero,

C_i =volume of a centre tank in cubic metres assumed to be breached by the damage as specified in Regulation 22 of this Annex; C_i for a segregated ballast tank may be taken equal to zero,

$K_i = 1 - (b_i/t_c)$; when b_i is equal to or greater than t_c , K_i shall be taken equal to zero,

$Z_i = 1 - (h_i/v_s)$; when h_i is equal to or greater than v_s , Z_i shall be taken equal to zero,

b_i =width of wing tank in metres under consideration,

h_i =minimum depth of the double bottom in metres under consideration; where no double bottom is fitted h_i shall be taken equal to zero,

t_c =transverse extent of side damage as defined in Regulation 22 of this Annex.

v_s =vertical extent of bottom damage as defined in Regulation 22 of this Annex.

(2) If a void space or segregated water ballast tank of a length less than e_c as defined in Regulation 22 of this Annex is located between wing oil tanks,⁴⁶ O_c in formula (I) may be calculated on the basis of volume W_i being the actual volume of one such tank (where they are of equal capacity) or the smaller of the two tanks (if they differ in capacity) adjacent to such space, multiplied by S_i as defined below and taking for all other wing tanks involved in such a collision the value of the actual full volume.

$$S_i = 1 - \frac{l_i}{l_c}$$

where: e_c = length in metres of void space or segregated ballast tank under consideration.

(3) (a) Credit shall only be given in respect of double bottom tanks which are either empty or carrying clean water when cargo is carried in the tanks above.

(b) Where the double bottom does not extend for the full length and width of the tank involved, the double bottom is considered non-existent and the volume of the tanks above the area of the bottom damage shall be included in formula (II) even if the tank is not considered breached because of the installation of such a partial double bottom.

(c) Suction wells may be neglected in the determination of the value h_i provided such wells are not excessive in area and extend below the tank for a minimum distance and in no case more than half the height of the double bottom. If the depth of such a well exceeds half the height of the double bottom, h_i shall be taken equal to the double bottom height minus the well height.

Piping serving such wells if installed within the double bottom shall be fitted with valves or other closing arrangements located at the point of connexion to the tank served to prevent oil outflow in the event of damage to the piping. Such piping shall be installed as high from the bottom shell as possible.

(4) In the case where bottom damage simultaneously involves four centre tanks, the value of O_s may be calculated according to the formula

$$O_s = \frac{1}{4} (\sum Z_i W_i + \sum Z_i C_i) \quad (\text{III})$$

(5) An Administration may credit as reducing oil outflow in case of bottom damage, an installed cargo transfer system having an emergency high suction in each cargo oil tank, capable of transferring from a breached tank or tanks to segregated ballast tanks or to available cargo tankage if it can be assured that such tanks will have sufficient ullage. Credit for such a system would be governed by ability to transfer in two hours of operation, oil equal to one half of the largest of the breached tanks involved and by availability of equivalent receiving capacity in ballast or cargo tanks. The credit shall be confined to permitting calculation of O_s according to formula (III). The pipes for such suctions shall be installed at least at a height not less than the vertical extent of the bottom damage v_s .

The Administration shall supply the Organization with the information concerning the arrangements accepted by it, for circulation to other Contracting Governments.

REGULATION 24.—LIMITATION OF SIZE AND ARRANGEMENT OF CARGO TANKS

(1) Every new oil tanker shall comply with the provisions of this Regulation. Every existing oil tanker shall be required, within two years after the date of entry into force of the present Convention, to comply with the provisions of this Regulation, where such a tanker falls into either of the following categories:

(a) a tanker, the delivery of which is after 1 January [1977]; or

(b) a tanker to which both the following conditions apply:

(i) delivery is not later than 1 January [1977] and

(ii) the building contract is placed after 1 January [1972], or in cases where no building contract has previously been placed, the keel is laid or the tanker is at a similar stage of construction after 30 June [1972].⁴⁷

⁴⁶ One delegation suggested to extend the formula in this paragraph to supply also to centre tank void spaces.

⁴⁷ The dates shown in this sub-paragraph require further examination, particularly in view of the fact that some of these dates will be prior to the 1973 Conference.

(2) Cargo tanks of oil tankers shall be of such size and arrangements that the hypothetical outflow O_c or O_s calculated in accordance with the provisions of Regulation 25 of this Annex anywhere in the length of the ship does not exceed 30,000 cubic metres or $400 \sqrt[3]{DW}$, whichever is the greater, but subject to a maximum of 40,000 cubic metres.

(3) The volume of any one wing cargo oil tank of an oil tanker shall not exceed seventy-five percent of the limits of the hypothetical oil outflow referred to in paragraph (2) of this Regulation. The volume of any one centre cargo oil tank shall not exceed 50,000 cubic metres.

(4) The length of each cargo tank shall not exceed 10 metres or one of the following values, whichever is the greater:

(a) where no longitudinal bulkhead is provided: $0.1L$

(b) where a longitudinal bulkhead is provided at the centreline only: $0.15L$

(c) where two or more longitudinal bulkheads are provided:

(i) for wing tanks: $0.2L$

(ii) for centre tanks:

(a.a) if b_1/B is equal to or greater than $1/5$: $0.2L$

(b.b) if b_1/B is less than $1/5$:

where no centreline longitudinal bulkhead is provided: $(0.5 b_1/B + 0.1)L$

where a centreline longitudinal bulkhead is provided: $(0.25 b_1/B + 0.15)L$

REGULATION 25.—SUBDIVISION AND STABILITY⁴⁸

(1) Every new oil tanker shall comply with the subdivision and damage stability criteria as specified in paragraph (3) of this Regulation after the assumed side or bottom damage as specified in paragraph (2) of this Regulation, for any operating draught reflecting actual partial or full load conditions consistent with trim and strength of the ship as well as specific gravities of the cargo. Such damage shall be applied to all conceivable locations along the length of the ship as follows:

(a) in ships of more than 225 metres in length, anywhere in the ship's length;

(b) in ships of more than 150 metres, but not exceeding 225 metres in length, anywhere in the ship's length except involving either after or forward bulkhead bounding the machinery space located aft. The machinery space shall be treated as a single floodable compartment;

(c) in ships not exceeding 150 metres in length, anywhere in the ship's length between adjacent transverse bulkheads with the exception of the machinery space. For ships of 100 metres or less in length where all requirements of paragraph (3) of this Regulation cannot be fulfilled without materially impairing the operational qualities of the ship, Administrations may allow relaxations from these requirements.

Ballast conditions where the ship is not carrying oil in cargo tanks excluding any oily residues, shall not be considered.

(2) The following provisions regarding the extent and the character of the assumed damage shall apply:

(a) the extent of side or bottom⁴⁹ damage shall be as specified in Regulation 22 of this Annex.⁵⁰ If any damage of lesser extent would result in a more severe condition such damage shall be assumed;

(b) where the damage involving transverse bulkheads is envisaged as specified in sub-paragraphs (1)(a) and (b) of this Regulation, transverse watertight bulkheads shall be spaced at least at a distance equal to the longitudinal extent of assumed damage specified in Regulation 22(a)(i) of this Annex, in order to be considered effective. Where transverse bulkheads are spaced at a lesser distance, one or more of these bulkheads within such extent of damage shall be assumed as non-existent for the purpose of determining flooded compartments.

⁴⁸ The possible implications of the requirements of this Regulation on the design of segregated ballast tankers should be investigated.

⁴⁹ Several delegations considered that the adoption of bottom damage length as drafted in Regulation 22(b) of this Annex has resulted in a conflict with the requirements for the spacing of transverse bulkheads as specified in sub-paragraphs (b) and (c) of this paragraph with regard to side damage. Investigations should be made, therefore, on the implications of using the bottom damage length given in Regulation 22(b) in this context, particularly with reference to such damage within forward $0.3L$ of the ship.

⁵⁰ Although many delegations preferred the assumed longitudinal extent of side damage as provided for in the 1960 Safety Convention, it was considered expedient to use the longitudinal extent referred to in Regulation 22 of this Annex only for the sake of consistency throughout the Marine Pollution Convention.

(c) Where the damage between adjacent transverse watertight bulkheads is envisaged as specified in sub-paragraph (1)(o) of this Regulation, no main transverse bulkhead or a transverse bulkhead bounding side tanks or double bottom tanks shall be assumed damaged, unless :

(i) the spacing of the adjacent bulkheads is less than the longitudinal extent of assumed damage specified in Regulation 22(a)(i) of this Annex; or

(ii) there is a step or a recess in a transverse bulkhead of more than 3.05 metres in length, located within the extent of penetration of assumed damage: the step formed by the after peak bulkhead and after peak tank top shall not be regarded as a step for the purpose of this Regulation.

(d) If pipes, ducts or tunnels are situated within the assumed extent of damage, arrangements shall be made so that progressive flooding cannot thereby extend to compartments other than those assumed to be floodable for each case of damage.

(3) Oil tankers shall be regarded as complying with the damage stability criteria if the following requirements are met :

(a) The final waterline taking into account sinkage, heel and trim shall be below the lower edge of any opening through which progressive flooding may take place. Such openings shall include air pipes and those which are closed by means of weathertight doors or hatch covers, and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and side scuttles of the non-opening type.

(b) In the final stage of flooding, the angle of heel due to unsymmetrical flooding shall not exceed 25 degrees, provided that this angle may be increased up to 30 degrees if no deck edge immersion occurs.

(c) The stability in the final stage of flooding shall be investigated and may be regarded as sufficient if the righting lever curve has at least a range of 20 degrees beyond the position of equilibrium in association with a maximum residual righting lever of at least 0.1 metre. The Administration shall give consideration to the potential hazard presented by protected or unprotected openings which may become temporarily immersed within the range of residual stability.

(d) The Administration shall be satisfied that the stability is sufficient during intermediate stages of flooding.

(4) The requirements of paragraph (1) of this Regulation shall be confirmed by calculations which take into consideration the design characteristics of the ship, the arrangements, configuration and contents of the damaged compartments as well as distribution, specific gravities and the free surface effect of liquids. The calculations shall be based on the following :

(a) Account shall be taken of any empty or partially filled tank, the specific gravity of cargoes carried, as well as any outflow of liquids from damaged compartments.⁵¹

(b) The permeabilities are assumed as follows :

<i>Spaces</i>	<i>Permeability</i>
Appropriated to stores-----	0.60
Occupied by accommodation-----	0.95
Occupied by machinery-----	0.85
Voids-----	0.95
Intended for consumable liquids-----	0 or 0.95*
Intended for other liquids-----	9 to 0.95**

*Whichever results in the more severe requirements.

**The permeability of partially filled compartments shall be consistent with the amount of liquid carried.

(c) The buoyancy of any superstructure directly above the side damage shall be disregarded. The unflooded parts of superstructures beyond the extent of damage, however, may be taken into consideration provided that they are separated from the damaged space by watertight bulkheads and the requirements of sub-paragraph (3)(a) of this Regulation in respect of these intact spaces are complied with. Hinged watertight doors may be acceptable in watertight bulkheads in the superstructure.

⁵¹ Further study should be carried out to assess the effect of outflow of liquids from damaged compartments.

(d) The free surface effect shall be calculated at an angle of heel of 5 degrees for each individual compartment. The Administration may require or allow the free surface corrections to be calculated at an angle of heel greater than 5 degrees for partially-filled tanks.

(e) In calculating the effect of free surfaces of consumable liquids it shall be assumed that, for each type of liquid at least one transverse pair or a single centre line tank has a free surface and the tank or combination of tanks to be taken into account shall be those where the effect of free surfaces is the greatest.

(5) The Master of every oil tanker and the person in charge of a non-self-propelled oil tanker to which this Annex applies shall be supplied in an approved form with:

(a) information relative to loading and distribution of cargo necessary to ensure compliance with the provisions of this Regulation; and

(b) data on the ability of the ship to comply with damage stability criteria as determined by this Regulation, including the effect of relaxations that may have been allowed under sub-paragraph (1) (c) of this Regulation.

[Pumping and Piping Arrangements for Cargo Transfer⁵²]

REGULATION 26.—SHIPS WHICH ARE STATIONARY

(1) Any discharge [into the sea] of oil or oily mixtures from ships which are stationary shall be prohibited except when the following conditions are satisfied:

(a) the effluent is equivalent to clean ballast as defined in Regulation 1(16) of this Annex; and

(b) the stationary ship is not within any of the areas defined in Regulation 1(10) of this Annex.

(2) Stationary ships, when located in special areas defined in Regulation 1(10) of this Annex shall be subject to appropriate requirements of Regulation 12 of this Annex.⁵³

(3) [———]⁵⁴ If the tank from which water or oily mixture is discharged is fitted with an oil content monitoring arrangement approved by the Administration, evidence based on such an arrangement to the effect that the oil content of the effluent did not exceed [15] parts per million shall be determinative that the provisions of the Convention have not been violated.

(4) The discharge shall not contain chemicals or other substances which are hazardous to the marine environment. The discharge shall not contain chemicals or other substances introduced for the purpose of circumventing the conditions of discharge specified in this Regulation.

(5) Paragraph (1) of this Regulation shall not apply to:

(a) the discharge of oil or oily mixture from a stationary ship necessary for the purpose of securing the safety of the structure or saving life at sea; or

(b) the escape of oil or oily mixture resulting from damage to a stationary ship or its equipment, if all reasonable precautions have been taken after the occurrence of the damage or discovery of the leakage for the purpose of preventing or minimizing the escape; or

(c) the discharge into the sea of substances containing oil, approved by the Administration, when being used as dispersants for the purpose of combating specific pollution incidents in order to minimize the damage from pollution.

(6) Stationary ships shall be equipped, as far as practicable, with installations in order to retain on board or discharge oil or oily mixture in accordance with the requirements of paragraph (1) of this Regulation to the satisfaction of the Administration.

(7) A tank or tanks of adequate capacity shall be provided to receive any oily residues resulting from the purification of oil if such purification is carried out on the stationary ship.

⁵² (1) Several delegations suggested that consideration should be given to a need for a regulation that appropriate arrangements should be made to provide ashore equipment capable of transferring cargo from compartments in the case of accidents to oil tankers.

(1) Some delegations suggested the inclusion of the following regulation:

"Each new oil tanker [of not less than [size limit]] shall be equipped with self-contained fixed or portable pumping and piping arrangements capable of pumping cargo from the damaged compartment, beginning from the upper layers of the cargo, to another compartment or outside the ship.

⁵³ Consideration should be given to the extension of Regulation 12 to cover requirements for fixed platforms.

⁵⁴ See footnote 21 under Regulation 9(3) of this Annex.

(8) At least one pipeline for the discharge of oil contaminated water to a reception facility, if such discharge is to be made, shall be led to a reasonably accessible area of the stationary ship.

(9) To enable pipes at reception facilities to be connected with the stationary ship's pipe discharge line, if provided, for oily residues, both lines shall be fitted with a standard connection in accordance with Regulation 19 of this Annex.

(10) The Administration shall establish appropriate measures in regard to inspection and survey to ensure that the provisions of this Regulation are complied with.

(11) Every stationary ship shall keep a record of all operations involving oil or oily mixture discharges. This record shall be in a form acceptable to the Administration.

(12) The notification procedure set out in Article 7 of the present Convention shall apply to all incidents which have given or may give rise to discharge of oil, exceeding [—] metric tons. Such reports shall contain details of the description and quantity of oil released or has escaped and any other useful information as appropriate.

APPENDIX I TO ANNEX I

LIST OF OILS TO WHICH ANNEX I OF THE PRESENT CONVENTION APPLIES⁵⁵

For the purposes of the present Convention, Oil as defined in Regulation 1 of this Annex includes, but is not limited to:

Asphalt	Fuel Oils:
Asphalt Blending Stocks:	No. 1 (Kerosene)
Roofers Flux	No. 1-D
Straight Run Residue	No. 2
Creosote	No. 2-D
Distillates:	No. 4
Straight Run	No. 5
Flashed Feed Stocks	No. 6
Gas Oil: Cracked	Residual
Gasoline Blending Stocks:	Road
Alkylates	Transformer
Reformats	Miscellaneous Oils, including
Gasolines:	Absorption
Casinghead (natural)	Aromatic
Automotive (containing not over 4.23 grams lead per gallon)	Coal Tar
Aviation (containing not over 4.86 grams lead per gallon)	Heartcut Distillate
Polymer	Lubricating
Straight Run	Mineral Seal
Jet Fuels:	Mineral
JP-1 (Kerosene)	Motor
JP-3	Penetrating
JP-4	Range
JP-5 (Kerosene, Heavy)	Resinous Petroleum
Kerosene	Rosin
Latex, Liquid Synthetic	Spindle
Mineral Spirits	Spray
Naphtha:	Tall
Solvent	Turbine
Stoddard Solvent	Petrolatum
Varnish Makers & Painters (75%)	Petroleum Naphtha
Oils:	Waxes:
Clarified	Carnauba
Crude Oil	Paraffin
Diesel Oil	

⁵⁵ (i) This list was submitted by one delegation. Its contents have not been examined in depth.

(ii) Several delegations suggested that the list should be divided into two Categories, one for persistent oils and the other for non-persistent oils (see the Addendum to footnote 14 under Regulation 9(1)).

APPENDIX II TO ANNEX I

Forms of International Oil Pollution Prevention
Certificates (1973)

A. CERTIFICATE FOR OIL TANKERS

International Oil Pollution Prevention Certificate (1973)
(Oil Tankers)

(Official Seal)

Issued under the Provisions of the International Convention for the Prevention
of Pollution from Ships, 1973, under the Authority of the Government of

.....
(full designation of the country)

by
(full designation of the competent person or organization
recognized under the provisions of the International Convention
for the Prevention of Pollution from Ships, 1973)

Name of Ship	Distinctive Number or Letter	Port of Registry	Gross Tonnage

Date on which keel was laid or ship was in a similar stage of construction:

.....

Date of building contract:

Date on which a major conversion is commenced:

Date of delivery:

It is certified that:

(1) The ship is

(a) required to be constructed according to and complies with*

(b) not required to be constructed according to*

(c) not required to be constructed according to, but complies with*
the requirements of Regulation 24 of Annex I of the said Convention.

(2) The capacity of segregated ballast tanks is^{56/}..... cubic metres.
This satisfies the requirements of Regulation 13(3)^{56/}

* Delete as appropriate

^{56/}This part might require amendments, depending on the decision of the Conference on the final text of Regulation 13(3).

(3) The ship is provided with arrangements for:

(a) the load on top system,*

(b) the retention of oil on board for subsequent discharge ashore,*
and equipped with:

(c) an oil discharge monitoring and control system,*

(d) a specified slop tank. *

THIS IS TO CERTIFY

That the ship has been surveyed in accordance with Regulation 4 of Annex I to the International Convention for the Prevention of Pollution from Ships, 1973, concerning the prevention of pollution by oil; and

That the survey showed that the condition of the construction and equipment of the ship was in all respects satisfactory and that the ship complies with the applicable requirements of Annex I of the said Convention.

* Delete as appropriate

This Certificate is valid until
 subject to periodical inspection in accordance with
 Regulation 4 of Annex I of the said Convention.

Issued at
 (Place of issue of certificate)

..... 19 ..
 (Date of issue)

.....
 (Signature of official issuing
 the certificate and/or seal of
 issuing authority)

If signed, the following paragraph is to be added:

The undersigned declares that he is duly authorized
 by the said Government to issue this Certificate.

Periodical inspections

This is to certify that at a periodical inspection required by
 Regulation 4(1)(c) of Annex I of the said Convention, this ship
 was found to comply with the relevant provisions of the said
 Convention.

Place
 Signature and/or Seal of issuing authority

Date

Place
 Signature and/or Seal of issuing authority

Date

The provisions of the Convention being fully complied with by this ship,
 the validity of this certificate is, in accordance with Regulation 8(2)
 of Annex I of the Convention, extended until

Place

Date

Signature and/or Seal of issuing authority

B. CERTIFICATE FOR SHIPS OTHER THAN OIL TANKERS

International Oil Pollution Prevention Certificate (1973)
(Ships other than Oil Tankers)

(Official Seal)

Issued under the Provisions of the International Convention for the Prevention of Pollution from Ships, 1973, under the Authority of the Government of

.....
(full designation of the country)

by
(full designation of the competent person
or organization recognized under the
provisions of the International Convention
for the Prevention of Pollution from
Ships, 1973)

Name of Ship	Distinctive Number or Letter	Port of Registry	Gross Tonnage

Type of ship:

Date on which keel was laid or ship was in a similar stage of construction:

Date of building contract:

Date of which a major conversion is commenced:

Date of delivery:

It is certified that the ship is equipped with asystem.

THIS IS TO CERTIFY

That the ship has been surveyed in accordance with Regulation 4 of Annex I to the International Convention for the Prevention of Pollution from Ships, 1973, concerning the prevention of pollution by oil; and

That the survey showed that the condition of the construction and equipment of the ship was in all respects satisfactory and that the ship complies with the applicable requirements of Annex I of the said Convention.

Particulars of requirements from which exemption is granted under Regulation 2(2) and 2(4)(b) of Annex I of the Convention:

.....

This Certificate is valid until
 subject to periodical inspection in accordance with Regulation 4 of Annex I of the said Convention.

Issued at
 (Place of issue of certificate)

..... 19
 (Date of issue)

.....
 (Signature of official issuing
 the certificate and/or seal of
 issuing authority)

If signed, the following paragraph is to be added:

The undersigned declares that he is duly authorized by the said Government to issue this Certificate.

Periodical inspections

This is to certify that at a periodical inspection required by Regulation 4(1)(b) of Annex I of the said Convention, this ship was found to comply with the relevant provisions of the said Convention.

Place Date
Signature and/or Seal of issuing authority

Place Date
Signature and/or Seal of issuing authority

The provisions of the Convention being fully complied with by this ship, the validity of this certificate is, in accordance with Regulation 8(2) of Annex I of the Convention, extended until

Place Date
Signature and/or Seal of issuing authority

APPENDIX III TO ANNEX I

FORM OF OIL RECORD BOOK^{51/}

I - FOR OIL TANKERS

Name of ship

Total cargo carrying capacity of ship in cubic metres

Voyage from to

(a) *Loading of oil cargo*

1. Date and place of loading			
2. Types of oil loaded			
3. Identity of tank(s) loaded			

(b) *Transfer of oil cargo during voyage*

4. Date of transfer			
5. Identity of tank(s)	i	From	
	ii	To	
6. Was(were) tank(s) in 5(i) emptied?			

(c) *Discharge of oil cargo*

7. Date and place of discharge			
8. Identity of tank(s) discharged			
9. Was(were) tank(s) emptied?			

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The draft is a reproduction of the Form as adopted in A.175(VI) and would require amendments in the light of draft Regulation 21 of this Annex. It may be found expedient to add some provision in Appendix IV to allow Contracting Governments to accept a simplified form of oil record book for very small ships, mainly on coastal voyages. The need for this depends upon the minimum size of ships to be specified in Regulation 21 of this Annex.

(d) *Ballasting of cargo tanks*

10. Identity of tank(s) ballasted			
11. Date and position of ship at start of ballasting			

(e) *Cleaning of cargo tanks*

12. Identity of tank(s) cleaned			
13. Date and duration of cleaning			
14. Methods of cleaning*			

(f) *Discharge of dirty ballast*

15. Identity of tank(s)			
16. Date and position of ship at start of discharge to sea			
17. Date and position of ship at finish of discharge to sea			
18. Ship's speed(s) during discharge			
19. Quantity discharged to sea			
20. Quantity of polluted water transferred to slop tank(s) (identify slop tank(s))			
21. Date and port of discharge into shore reception facilities (if applicable)			

* Hand hosing, machine washing or chemical cleaning. Where chemically cleaned, the chemical concerned and the amount used should be stated.

(g) *Discharge of water from slop tanks*

22. Identity of slop tank(s)			
23. Time of settling from last entry of residues, or			
24. Time of settling from last discharge			
25. Date, time and position of ship at start of discharge			
26. Sounding of total contents at start of discharge			
27. Sounding of interface at start of discharge			
28. Bulk quantity discharged and rate of discharge			
29. Final quantity discharged and rate of discharge			
30. Date, time and position of ship at end of discharge			
31. Ship's speed(s) during discharge			
32. Sounding of interface at end of discharge			

(h) *Disposal of residues*

33. Identity of tank(s)			
34. Quantity disposed from each tank			
35. Method of disposal of residue: (a) Reception facilities (b) Mixed with cargo (c) Transferred to another(other) tank(s) (identify tank(s)) (d) Other method			
36. Date and port of disposal of residue			

- (i) *Discharge overboard of bilge water containing oil which has accumulated in machinery spaces (including pump rooms) whilst in port**

37. Port			
38. Duration of stay			
39. Quantity disposed			
40. Date and place of disposal			
41. Method of disposal (state whether a separator was used)			

- (j) *Accidental or other exceptional discharges of oil*

42. Date and time of occurrence			
43. Place or position of ship at time of occurrence			
44. Approximate quantity and type of oil			
45. Circumstances of discharge or escape and general remarks			

..... Signature of Officer or Officers in charge of operation concerned

..... Signature of Master

* Where the pump starts automatically and discharges through a separator at all times it will be sufficient to enter each day "Automatic discharge from bilges through separator".

II - FOR SHIPS OTHER THAN OIL TANKERS

Name of ship.....

(a) *Ballasting or cleaning of bunker fuel tanks*

1. Identity of tank(s) ballasted			
2. Whether cleaned since they last contained oil and, if not, type of oil previously carried			
3. Date and position of ship at start of cleaning			
4. Date and position of ship at start of ballasting			

(b) *Discharge of dirty ballast or cleaning water from tanks referred to under (a)*

5. Identity of tank(s)			
6. Date and position of ship at start of discharge			
7. Date and position of ship at finish of discharge			
8. Ship's speed(s) during discharge			
9. Method of discharge (state whether separator used)			
10. Quantity discharged			

(c) *Disposal of residues*

11. Quantity of residue retained on board			
12. Methods of disposal of residue: (a) reception facilities (b) mixed with next bunkering (c) transferred to another(other) tank			
13. Date and port of disposal of residue			

- (d) *Discharge overboard of bilge water containing oil which has accumulated in machinery spaces whilst in port**

14. Port			
15. Duration of stay			
16. Quantity disposed			
17. Date and place of disposal			
18. Method of disposal (state whether separator was used)			

- (e) *Accidental or other exceptional discharges of oil*

19. Date and time of occurrence			
20. Place or position of ship at time of occurrence			
21. Approximate quantity and type of oil			
22. Circumstances of discharge or escape and general remarks			

..... Signature of Officer or Officers
in charge of operations concerned

..... Signature of Master

* Where the pump starts automatically and discharges through a separator at all times it will be sufficient to enter each day "Automatic discharge from bilges through a separator".

ADDENDUM TO FOOTNOTE¹⁴

The delegations of Denmark, France, Federal Republic of Germany, Netherlands, Norway, Sweden and the United Kingdom are of the opinion that the treatment proposed for the black oil (persistent) group in Regulation 9 is not appropriate for the white oil (non-persistent) group, the actual hazards of which have not been adequately evaluated.

(a) Black oils because of their persistence can travel on the surface of the water for some distance under the action of winds and currents. The controls of effluents in Regulation 9 (60 litres per mile) ensure that crude oil tank washing and other discharges do not pollute and the 50 mile requirement for these effluents provides a very large margin for the protection of shallow areas and beaches in the area if the stipulated discharge criteria are inadvertently exceeded.

(b) White oils even when discharged in substantial quantity in the open sea have very short lived persistence as evidenced by the recent tests by the United Kingdom off Milford Haven (PCMP/4/33). These tests involved the discharge of gas oil and gasoline at rates and concentrations which would never be reached in operational practice (the rates were as high as 50m³ and 30m³ per mile respectively). The heavy gas oil, the least volatile of the white oil group, produced only trace indications 2½ hours after the discharge when only a small quantity (between 2% and 12% of the original discharge) remained in the sea at a concentration below 0.5 ppm in the sub-surface layers. A similar test with gasoline, with its higher evaporative rate, produced no discernible traces either on the surface or in the water column in 60 minutes from the discharge, the discharge, in this time, having vaporised completely. The residues in the water are considered to be no more harmful probably than substances in Annex II, Category C.

(c) Retention procedures appropriate for the carriage of crude oils are not applicable for white oils since it is inadvisable to mix retained product residues with subsequent cargoes.

Nevertheless it is believed that some sensible control should be imposed upon white oil discharge to the sea in order to prevent malpractice and to ensure that no pollution of the sea is produced when such discharge takes place by regulating the discharge in a way which will aid its natural evaporation and dispersal.

The basis on which controls which the delegations consider would produce no pollution of the sea could, it is suggested, be produced by developing the following concepts:

(1) Ships on final discharge of white oil cargoes shall strip the cargo tanks and drain lines ashore to the maximum extent practicable.

(2) Lines shall not be flushed direct to sea but flushed back to appropriate cargo tanks.

(3) Discharge to the sea of line flushings and/or tank wash water from cargo tanks shall only commence when there is water in the tank bottom of at least [1/100] of the tank volume.

(4) Such discharge to the sea should be at the minimum rate practicable by the ship's pumping arrangements.

(5) Such discharge shall only be made when the tanker is at least [———] miles from the nearest land, is in a given depth of water, and is proceeding en route at a specified minimum speed.

A preliminary division of the oils listed in Appendix to this Annex into Class I (persistent or black oils) and Class II (non-persistent or white oils) is attached for further consideration.

The delegations mentioned consider that the above procedure is more consistent with the proposals in Annex II for generally similar but, in some cases, more toxic substances than the petroleum products referred to here. If there is doubt as to the adequacy of the above procedure it is suggested that a representative selection of white oil products be put forward to GESAMP for expert assessment of the comparative hazards.

APPENDIX

LIST OF OILS IN CATEGORY I

Crude oils: Reconstituted crude.

Diesel Fuels: Marine diesel oils.

Residual Fuel Oils: No. 4 fuel, No. 5 fuel, No. 6 fuel, and Bunker "C".

Asphalts: Coatings, and road oils.

Lubricating Oils: Automotive, industrial, cutting oils, and transformer oils.

Lubricating Oil Blend Stocks: Bright stocks, lubricating oil distillates, solvent

¹⁴ See footnote p. 273.

LIST OF OILS IN CATEGORY II

neutral oils, and lubricating oil additives.

Natural Gas Liquids.

Gasoline: Automotive, Aviation, and marine.

Jet Fuels: JP 1, JP 3, JP 4, JP 5, and turbo fuel.

Kerosenes: Paraffin.

Distillates: Gas oils, automotive diesel, heating oils, and marine gas oil.

Fuel Oil: No. 1 (Kerosene), and No. 2 (distillates).

Intermediate Stocks: Gasoline blending stocks, naphthas, cracked stocks, alkylates—fuel, polymers—fuel, reformates, petroleum solvents, synthetic petroleum, and white spirit (PVM naphtha).

ANNEX II—REGULATIONS FOR THE CONTROL OF POLLUTION BY NOXIOUS LIQUID SUBSTANCES IN BULK

REGULATION 1—DEFINITIONS

For the purposes of this Annex:

(1) "Chemical tanker" means a ship constructed or adapted primarily to carry a cargo of noxious liquid substances in bulk and includes an oil tanker when carrying a cargo or part cargo of noxious liquid substances in bulk.

(2) "Clean ballast" means ballast carried in a tank which, since it was last used to carry a cargo containing a substance in Categories A, B or C, has been cleaned and the residues resulting therefrom have been discharged in accordance with the appropriate requirements of Regulation 5 of this Annex.

(3) "Nearest land" is as defined in Regulation 1(9) of Annex I to the present Convention.

(4) "Liquid substance" means a substance having a vapour pressure not exceeding 2.8 kg/cm² at a temperature of 37.8°C.

(5) "Noxious substance" means a harmful substance other than oil, sewage or garbage as defined in Annexes I, IV and V respectively.

REGULATION 2—APPLICATION

(1) Unless expressly provided otherwise the provisions of this Annex shall apply to all ships carrying noxious liquid substances in bulk [other than stationary ships¹ for which only Regulation 12 of this Annex shall apply].

(2) Where chemical tankers carry a cargo of oil and/or discharge oil or oily mixtures the relevant requirements of Annex I shall also apply.

REGULATION 3—CATEGORIZATION AND LISTING OF NOXIOUS SUBSTANCES

(1) For the purpose of the Regulations of this Annex, except Regulation 11, noxious liquid substances shall be divided into three categories. The guidelines used in the categorization of noxious substances are given in Appendix I to this Annex:

(a) Category A—Substances which if released into the sea from tank cleaning or deballasting operations would present a major hazard to either marine resources or human health or cause serious harm to amenities or other legitimate uses of the sea and therefore justify the application of special measures to prevent their escape into the marine environment.

(b) Category B—Substances which when released into the sea from tank cleaning or deballasting operations may present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of special anti-pollution measures.

(c) Category C—Substances which when released into the sea from tank washing and deballasting operations may present a minor hazard to either marine resources or human health or cause minor harm to amenities or other uses of the sea and therefore require special operational conditions.

(2) The list of noxious liquid substances carried in bulk and presently categorized which are subject to the provisions of this Annex is set out in Appendix II to this Annex.

(3) Where it is proposed to carry a liquid substance in bulk, which has not been categorized under paragraph (1) of this Regulation, nor evaluated as re-

¹ The term "stationary ships" might need to be improved. Further consideration should also be given to the implications of extending the requirements for fixed platforms to other stationary craft.

ferred to in Regulation 4 of this Annex, the Contracting Governments involved shall establish and agree on a provisional categorization on the basis of the guidelines referred to in paragraph (1) of this Regulation and thus establish conditions for the carriage of the substance. [Until full agreement between the Governments involved has been reached, the substance shall be carried under the most severe conditions proposed.] As soon as possible, but not later than 90 days after its first carriage, the Administration concerned shall notify the Organization and provide details of the substance and the provisionally assigned category for prompt circulation to all Contracting Governments for their information and consideration.²

REGULATION 4—OTHER LIQUID SUBSTANCES

(1) The substances listed in Appendix III to this Annex have been evaluated and found falling outside the Categories A, B, and C as defined in Regulation 3(1) of this Annex because they, when released into the sea from tank washing or deballasting operations, are presently considered to present negligible or no harm to human health or marine resources or amenities or other legitimate uses of the sea.

(2) The discharge of bilge or ballast water or other residues or mixtures containing substances referred to in paragraph (1) above shall not be subject to any requirements of this Annex.³

REGULATION 5—DISCHARGE OF NOXIOUS SUBSTANCES

Subject to the provisions of Regulation 6 of this Annex,

(1) The discharge into the sea of substances in Category A as defined in Regulation 3(1) (a) of this Annex or those provisionally categorized as such or ballast water, tank washings, or other residues or mixtures containing such substances, shall be prohibited. If tanks containing such substances or mixtures are to be washed, the resulting residues shall be discharged to a reception facility until the concentration of the substance in the effluent to such facility is at or below the residual concentration⁴ prescribed for that substance in Appendix II to this Annex and the tank is as empty as practicable. Provided that the residue then remaining in the tank is subsequently diluted by the addition of a volume of water of not less than [5]% of the total volume of the tank, it may be discharged to the sea when all the following conditions are also satisfied:⁵

(a) the ship is proceeding en route at a speed of at least 7 knots [4 knots for barges];

(b) the procedures and arrangements for discharge shall be such as to assure the Administration^{6,7} on the basis of reliable calculation, that the concentration of the substance shall be adequately further diluted when it reaches the wake immediately astern of the ship;

(c) discharge is made below the waterline, taking into account the location of the seawater intakes; and

(d) the discharge is made at a distance of not less than [12] nautical miles from the nearest land in a depth of water of not less than [25] metres.

(2) The discharge into the sea of substances in Category B, as defined in Regulation 3(1) (b) of this Annex or those provisionally categorized as such as ballast water, tank washings, or other residues or mixtures containing such substances shall be prohibited. However, such mixtures may be discharged when the following conditions are all satisfied⁸:

² This paragraph should be reviewed in the light of Article 17(3) (c).

³ One delegation expressed the view that this paragraph should be reviewed to ensure that it is compatible with the Ocean Dumping Convention.

⁴ Concentrations of 0.01% by weight for bioaccumulative substances and 0.1% by weight for other substances are to be specified in Appendix II.

⁵ Some delegations suggested the insertion of the following words at the beginning of this sentence: "Without prejudice to more stringent regulations which a coastal State may make [within the limits of national jurisdiction/in respect of areas under its jurisdiction/in respect of waters under its jurisdiction]."

⁶ Some delegations felt that the Contracting Government of a receiving State should be substituted for the Administration.

⁷ See draft Resolution 4.

⁸ See footnote 5.

(a) the ship is proceeding en route at a speed of at least 7 knots [4 knots for barges];

(b) procedures and arrangements for the discharge shall be such as to assure the Administration^{9 7} on the basis of reliable calculation, that the concentration of the substance discharged may be expected not to exceed 1 part per million in the wake immediately astern of the ship;

(c) the maximum quantity of cargo discharged into the sea from each tank and its associated piping system does not exceed [1] cubic metre or [1/3,000] of the tank capacity in cubic metres, whichever is the greater;

(d) the discharge is made below the waterline, taking into account the location of the sea water intakes; and

(e) the discharge is made with the ship not less than [12] nautical miles from the nearest land and in a depth of water of not less than [25] metres.

(3) The discharge into the sea of substances in Category C, as defined in Regulation 3(1)(c) of this Annex or those provisionally categorized as such or ballast water, tank washings, or other residues or mixtures containing such substances shall be prohibited. However, such mixtures may be discharged when the following conditions are all satisfied¹⁰:

(a) the ship is proceeding en route at a speed of at least 7 knots [4 knots for barges];

(b) procedures and arrangements for the discharge shall be such as to assure the Administration^{11 7} on the basis of reliable calculation that the concentration of the substance discharged may be expected not to exceed [10 parts per million]¹² in the wake immediately astern of the ship;

(c) the maximum quantity of cargo discharged from each tank and its associated piping system does not exceed [3] cubic metres or [1/1,000] of the tank capacity in cubic metres, whichever is the greater;

(d) the discharge is made below the waterline, taking into account the location of the sea water intakes; and

(e) the discharge is made with the ship not less than [12] nautical miles from the nearest land and in a depth of water of not less than [25] metres.

(4) Approved ventilation procedures may be used to remove cargo residues from a tank provided that the Administration is satisfied that the results of such procedures will be at least equivalent to those obtained by the requirements of paragraphs (1), (2) or (3) of this Regulation, whichever is applicable.

(5) The discharge of substances which have not been categorized, provisionally categorized, or evaluated as referred to in Regulation 4 of this Annex, or of ballast water, tank washings, or other residues or mixtures containing such substances shall be prohibited.

(6) The discharge of clean ballast shall not be subject to the requirements of this Regulation.

REGULATION 6—EXCEPTIONS

Regulation 5 of this Annex shall not apply to:

(a) the discharge of noxious substances or mixtures containing such substances, necessary for the purpose of securing the safety of the ship or saving life at sea; or

(b) the escape of noxious substances or mixtures containing such substances resulting from damage to a ship or its equipment, if all reasonable precautions have been taken after the occurrence of the damage or discovery of the leakage for the purpose of preventing or minimizing the escape; or

(c) the discharge into the sea of noxious substances approved by a Contracting Government for the purpose of combating a specific pollution incident, when used for that purpose under the supervision of that Government, with a view to minimizing the possible general damage from the pollution.

⁹ See footnote 6.

¹⁰ See footnote 5.

¹¹ See footnote 6.

¹² (i) The criteria specified in sub-paragraphs (b), (c) and (e) of paragraphs (2) and (3) of this Regulation are interdependent and must be considered in relation to each other.

(ii) One delegation was of the opinion that for a figure of 3 cubic metres in sub-paragraph (c) below, this concentration should be limited to 3 ppm.

REGULATION (———)—REPORTS ON INCIDENTS INVOLVING RELEASE OR
ESCAPE OF NOXIOUS SUBSTANCES¹³

REGULATION 7—RECEPTION FACILITIES

(1) Each Contracting Government shall take appropriate steps to ensure the provision of reception facilities according to the needs of ships using its terminals, ports, or repair ports:

(a) cargo receiving and loading ports shall have facilities adequate for reception without undue delay to ships of such residues and mixtures containing noxious substances as would remain for disposal from ships carrying them, as a consequence of the application of this Annex;

(b) ship repair ports undertaking repairs to chemical tankers shall be provided with facilities adequate for the reception of residues and mixtures containing noxious substances for disposal.

(2) Each Contracting Government shall determine and notify the Organization for each cargo receiving terminal and ship repair port in its territories the types of facilities provided for the purpose of sub-paragraph (1) (a) and (b) of this Regulation.

(3) As regards paragraph (1) of this Regulation each Contracting Government shall report to the Organization for transmission to the Contracting Governments concerned, all cases where facilities are alleged to be inadequate.

REGULATION 8—MEASURES OF CONTROL

Each Contracting Government shall appoint or authorize Surveyors whose duties shall include the inspection of ships for the purpose of implementing this Regulation.

Category A substances

(1) (a) If a tank is partially unloaded or unloaded but not cleaned, the Master shall make an appropriate entry in the Cargo Record Book;

(b) All subsequent cargo operations carried out in connection with that tank shall also be entered in the Cargo Record Book.

(2) If the tank is to be washed:

(a) The effluent from the tank washing operation shall be discharged from the ship to a reception facility at least until the concentration of cargo in the discharge, as indicated by analyses of samples of the effluent taken by the Surveyor, has fallen to the residual concentration specified for that substance in Appendix II to this Annex. When the required residual concentration has been achieved, any remaining tank washings shall be discharged to the reception facility. Appropriate entries, (e.g. residual concentrations, tank washings discharged to the reception facility, etc.) of these operations shall be made in the Cargo Record Book and certified by the Surveyor;

(b) After diluting the residue then remaining in the tank with at least 5% of the tank capacity of water, this mixture may be discharged at sea in accordance with the provisions of Regulation 5(1) (a), (b), (c) and (d) of this Annex. Appropriate entries of these operations shall be made in the Cargo Record Book.

(3) Where the Contracting Government of the receiving state is satisfied that it is impracticable to measure the concentration of the substance in the effluent without causing undue delay to the ship, that Contracting Government may accept an alternative procedure as being equivalent to sub-paragraph (a) above, provided that:

(a) a precleaning procedure for that tank and that substance has been developed and the Contracting Government is satisfied that such procedure will fulfill the provisions of Regulation 5(1) of this Annex;

(b) a surveyor duly authorized by the Contracting Government shall certify in the Cargo Record Book that:

(i) the tank, its pump and piping system have been emptied, and that the quantity of cargo remaining in the tank is at or below the quantity on which the approved precleaning procedure as referred to in paragraph (ii) below has been based;

(ii) precleaning has been carried out in accordance with the precleaning procedure approved by the Administration for that tank and that substance; and

(iii) the tank washings resulting from such precleaning have been discharged to a reception facility and the tank is as empty as practicable.

¹³ Depending on the final text of Article 7 to be adopted by the Conference, there might be a need to include appropriate requirements in this Annex.

(c) the discharge of any remaining residues shall be in accordance with the provisions of paragraph (2) (b) of this Regulation and the Master makes an appropriate entry in the Cargo Record Book.

Categories B and C substances

(4) Subject to such surveillance by the authorized Surveyor as may be deemed necessary by the Contracting Government, the Master of a vessel which has carried a Category B or C cargo shall ensure that the following operations are carried out:

(a) If a tank is partially unloaded or unloaded but not cleaned, the Master shall make an appropriate entry in the Cargo Record Book.

(b) If the tank is to be cleaned at sea, the Master shall:

(i) ensure that the cargo piping system serving that tank has been drained and that the appropriate entries have been made in the Cargo Record Book;

(ii) ascertain that the quantity remaining in the tank does not exceed the maximum quantity which may be discharged for that substance under Regulation 5(2) (c) of this Annex in the case of Category B and 5(3) (c) of this Annex for Category C substances, and make the appropriate entry in the Cargo Record Book¹⁴;

(iii) ensure that, prior to discharge by the previously approved procedures, the necessary dilution to achieve a mixture satisfactory for such a discharge has been achieved and that the appropriate entries have been made in the Cargo Record Book;

(iv) ensure that, if any internal transfer of washings takes place from that tank, appropriate entries are made in the Cargo Record Book;

(v) ensure that any subsequent discharges of such washings are made in accordance with the requirements of Regulation 5 of this Annex for the Category of cargo within.

(c) If it is decided to clean the tanks in port, the Master shall make appropriate entries in the Cargo Record Book indicating the location and disposition of the washings in accordance with the procedures approved by the Administration.

Discharge from a slop tank

(5) Any residues retained on board in a slop tank, including those from pump room bilges, which contain a Category A substance, shall be discharged to a reception facility in accordance with the provisions of Regulation (5) (1) of this Annex and an appropriate entry shall be made by the Master in the Cargo Record Book.

(6) Any residues retained on board in a slop tank including those from pump room bilges, which contain substances of Category B or C in excess of the maximum quantities specified in Regulation 5(2) (c) of this Annex for substances of Category B and Regulation 5(3) (c) of this Annex for substances of Category C shall be discharged to a reception facility and an appropriate entry shall be made by the Master in the Cargo Record Book.

REGULATION 9—CARGO RECORD BOOK

(1) Every ship to which this Annex applies shall be provided with a Cargo Record Book, whether as part of the ship's official log book or otherwise, in the form specified in Appendix IV to this Annex.

[(2) The Cargo Record Book shall be completed on each occasion, on a tank-to-tank basis, whenever any of the following operations take place in the ship:

(i) loading of cargo;

(ii) transfer of cargo during the voyage;

(iii) discharge of cargo;

(iv) transfer of cargo, cargo residues, etc., to a slop tank;

(v) cleaning of cargo tanks;

(vi) discharge of slop tanks;

(vii) ballasting of cargo tanks;

(viii) discharge of ballast water.¹⁵

¹⁴ Some delegations were of the opinion that the requirements of this sub-paragraph should in all cases be witnessed by the Surveyor.

¹⁵ This is a preliminary text which has been inserted only for the purpose of indicating the kinds of operations which will need to be covered. Further development will therefore be required.

(3) In the event of such discharge or escape of noxious liquid substances or mixture containing such substances as is referred to in Regulations 5 and 8 of this Annex, a Statement shall be made in the Cargo Record Book of the circumstances of, and the reason for, the discharge or escape.

(4) Each operation described in paragraph (2) of this Regulation shall be fully recorded without delay in the Cargo Record Book so that all the entries in the Book appropriate to that operation are completed. Each page of the Book shall be signed by the Officer or officers in charge of the operations concerned and when the ship is manned, by the Master of the ship. The written entries in the Cargo Record Book shall be in an official language of the relevant territory in respect of the ship, state the flag of which the ship is entitled to fly and¹⁶ in English or French.

(5) Cargo Record Books shall be kept in such a place as to be readily available for inspection at all reasonable times and, except in the case of unmanned ships under tow, shall be kept on board the ship. They shall be retained for a period of two years after the last entry has been made.

(6) The competent authority of a Contracting Government may inspect on board any ship to which the present Convention applies while within its port, the Cargo Record Book required to be carried in the ship in compliance with the provisions of this Regulation, and may make a true copy of any entry in that Book and may require the Master of the ship to certify that the copy is a true copy of such entry. Any copy so made which purports to have been certified by the Master of the ship as a true copy of an entry in the ship's Cargo Record Book shall be made admissible in any judicial proceedings as evidence of the facts stated in the entry. Any action by the competent authorities under this paragraph shall be taken as expeditiously as possible without causing the ship to be unduly delayed.

REGULATION 10.—CERTIFICATION AND DOCUMENTS

(1) (a) A chemical tanker shall be subject to the instructions required by Regulation 11 of this Annex. In addition, the arrangements for discharge in accordance with Regulation 5 of this Annex shall be surveyed.

(b) The Administration shall, after having satisfactorily surveyed a chemical tanker¹⁷ issue a Certificate of Fitness for the Carriage of Noxious Chemicals in Bulk.¹⁸ The Certificate shall be endorsed with details of any cargo tank washing procedures approved by the Administration in connexion with implementation of Regulation 5 of this Annex. Further, a note shall be inserted in the Cargo Record Book to the effect that the discharge arrangement according to Regulation 5 of this Annex has been approved by the Administration.

(2) (a) A ship other than a chemical tanker, fitted with space for the carriage of noxious substances in bulk shall be subject to the surveys and inspections specified below :

(i) a survey before the ship enters service shall include an inspection of its structure and equipment insofar as the ship is covered by this Annex. This survey shall be such as to ensure that the ship's arrangements fully comply with the requirements of this Annex.

(ii) a periodical survey at intervals specified by the Administration, but not exceeding five years, which shall be such as to ensure that the arrangements continue to comply with the requirements of this Annex.

(iii) a periodical inspection at intervals specified by the Administration, but not exceeding two years,¹⁹ which shall be such as to ensure that the equipment and associated pumps and pipings fully comply with the applicable requirements of this Annex and is in good working order.

¹⁶ Some delegations suggested the use of the word "or" in lieu of "and". Other delegations suggested that the entry in the Oil Record Book should be either English or French, or the national language and English or French.

¹⁷ Consideration should be given to the need for formulating explicit requirements for surveys similar to those in paragraph (2) of this Regulation.

¹⁸ Consideration should be given to the need for attaching a model form of this certificate.

¹⁹ Some delegations suggested that a two-month extension of the date of periodical inspection should be granted.

(b) The International Oil Pollution Prevention Certificate (1973) issued in pursuance of Regulation 5 of Annex I of the present Convention shall be endorsed to show that the ship has been surveyed in accordance with paragraph (2) of this Regulation and that the arrangements are such as to allow compliance with the provisions of this Annex.

REGULATION 11—REQUIREMENTS FOR MINIMIZING ACCIDENTAL POLLUTION

(1) The design, construction, equipment and operation of ships carrying in bulk noxious liquid substances which are subject to the provisions of this Annex shall be such as to minimize the uncontrolled release of such substances.

(2) Pursuant to the provisions of paragraph (1) of this Regulation, each Contracting Government shall issue, or cause to be issued, detailed instructions on the design, construction, equipment and operation of such ships.

(3) In respect of chemical tankers, the instructions referred to in paragraph (2) of this Regulation shall contain at least all the provisions given in the Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk²⁰ adopted by the Assembly of the Organization in Resolution A.212 (VII).²¹

REGULATION 12—REQUIREMENTS FOR STATIONARY SHIPS

[The discharge into the sea of any substance of Category A, B, or C as specified in Regulation 3(1) of this Annex, from any stationary ship or other craft operating in the marine environment, shall be prohibited].

APPENDIX I

GUIDELINES FOR CATEGORIZATION

Category A

Substances—Which are bioaccumulated and liable to produce a hazard to aquatic life or human health; or which are highly toxic to aquatic life as expressed by TLm less than 1 ppm; and additionally certain substances which are moderately toxic to aquatic life as expressed by a TLm greater than 1 and less than 10 ppm when particular weight is given to additional factors in the hazard profile or to special characteristics of the substance.

Category B

Substances—Which are bioaccumulated with a short retention of the order of one week or less; or which are liable to produce tainting of sea food; or which are moderately toxic to aquatic life as expressed by TLm greater than 1 and less than 10 ppm; and additionally certain substances which are slightly toxic to aquatic life as expressed by a TLm greater than 10 and less than 100 ppm when particular weight is given to additional factors in the hazard profile or special characteristics of substance.

Category C

Substances—Slightly toxic to aquatic life as expressed by TLm greater than 10 and less than 100 ppm; and additionally certain substances which are practically non-toxic to aquatic life as expressed by a TLm greater than 100 and less than 1,000 ppm when particular weight is given to additional factors in the hazard profile or special characteristics of the substance.

²⁰ The Code will be expanded to cover barges.

²¹ Provision may need to be made for the adoption and implementation of future amendments to the Code. See draft Resolution 3.

Other liquid substances

(For the Purposes of Regulation 4 of This Annex)

APPENDIX II

LIST OF NOXIOUS LIQUID SUBSTANCES CARRIED IN BULK

Substance	U.N. number	Pollution category for operational discharge (see reg. 3 of annex II) ¹	Residual concentration (percent by weight) applicable to category A substance only (see reg. 5(a) of annex II)
	I	II	III
Acetaldehyde.....	1089	C	-----
Acetic acid.....	1842	C	-----
Acetic anhydride.....	1715	C	-----
Acetone cyanohydrin.....	1541	A	0.1
Acetyl chloride.....	1717	C	-----
Acrolein.....	1092	A	.1
Acrylic acid.....	-----	(C)	-----
Acrylonitrile.....	1093	B	-----
Alkyl benzene sulfonate:			
(Straight chain).....	-----	C	-----
(Branched chain).....	-----	B	-----
Allyl alcohol.....	1098	B	-----
Allyl chloride.....	1100	C	-----
Ammonia (28 percent aqueous).....	1005	B	-----
iso-Amyl acetate.....	1104	C	-----
n-Amyl acetate.....	1104	C	-----
Aniline.....	1547	C	-----
Benzene.....	1114	C	-----
Benzyl chloride.....	1738	B	-----
Butyl butyrate.....	-----	(B)	-----
n-Butyraldehyde.....	1129	B	-----
iso-Butyraldehyde.....	2045	C	-----
Butyric acid.....	-----	B	-----
Camphor oil.....	1130	B	-----
Carbon disulphide.....	1131	A	.1
Carbon tetrachloride.....	1846	B	-----
Caustic potash.....	1814	C	-----
Chloroacetic acid.....	1750	C	-----
m-Chlorobenzene.....	1134	B	-----
Chloroform.....	1888	B	-----
Chloroprene.....	1991	(C)	-----
Chlorosulphonic acid.....	1754	C	-----
o-Chlorotoluene.....	-----	(B)	-----
Creosote.....	1334	A	.1
Cresols.....	2076	A	.1
Cresylic acid.....	2022	A	.1
Crotonaldehyde.....	1143	B	-----
Cumene.....	1918	C	-----
Cyclo-hexane.....	1145	C	-----
Dibenzyl ether.....	-----	(C)	-----
O-Dichlorobenzene.....	1591	A	.1
Dichlorobenzenes.....	1591	A	.1
Dichloroethyl ether.....	1916	B	-----
Dichloropropene—Dichloropropane mixture (D.D. soil fumigant).....	2047	B	-----
Diethylamine.....	1154	C	-----
Diethylbenzene (mixed isomers).....	2049	C	-----
Diethylene triamine.....	2079	(C)	-----
Diethylene glycol monoethyl ether.....	-----	C	-----
Di-iso-propanolamine.....	-----	C	-----
Di-iso-propylamine.....	1158	C	-----
Dimethylamine (40 percent aqueous).....	1160	C	-----
Dimethyl ethanolamine (2 Dimethylaminoethanol).....	2051	(C)	-----
1, 4-Dioxane.....	1165	(C)	-----
Dodecylbenzene.....	-----	C	-----
Epichlorohydrin.....	2023	B	-----
Ethyl amyl ketone.....	-----	(C)	-----
Ethylbenzene.....	1175	C	-----
Ethylene diamine.....	1604	C	-----
Ethylene dibromide.....	1605	B	-----

Substance	U.N.number	Pollution category for operational discharge (see reg. 3 of annex II) ¹	Residual concentration (percent by weight) applicable to category A substance only (see reg. 5(a) of annex II)
Ethylene dichloride.....	1184	B	
2-Ethylhexyl alcohol.....		(C)	
2-Ethyl 3-propyl-acrolein.....		(B)	
Formaldehyde (37 to 50 percent solution).....	1198	C	
Furfural.....	1199	C	
Furfuryl alcohol.....		C	
Hexamethylene diamine.....	1783	(C)	
Hydrofluoric acid (40 percent aqueous).....	1790	B	
Hydrogen peroxide (greater than 60 percent).....	2015	C	
Isopropylamine.....	1221	C	
Mesityl oxide.....	1229	(C)	
Methyl Acrylate.....	1919	C	
Methylene chloride.....	1593	B	
2-Methyl-5-ethyl-pyridine.....		(B)	
Monoisopropanolamine.....		C	
Monomethyl ethanolamine.....		C	
Mononitrobenzene.....		C	
Mono-iso-propylamine.....		C	
Naphthalene (molten).....	1334	A	.1
Naphthenic acids.....		(A)	(.1)
Nitric acid (90 percent).....	2031/2032	C	
o-Nitrotoluene.....	1664	C	
Nonyl alcohol.....		(C)	
Nonyl phenol.....		C	
iso-Octanol.....		C	
n-Octanol.....		C	
Oleum.....	1831	C	
Pentachloroethane.....	1669	(B)	
n-Pentane.....	1265	C	
Perchloroethylene (tetrachloroethylene).....	1897	B	
Phenol.....	1671	B	
Phosphorus (elemental).....	1338	A	.1
Phthalic Anhydride (molten).....		C	
beta-Propiolactone.....		(B)	
n-Propyl acetate.....	1276	(C)	
n-Propylamine.....	1277	C	
Pyridine.....	1282	B	
Sodium biochromate (solution).....		C	
Sodium hydroxide.....	1824	C	
Sodium pentachlorophenate (solution).....		A	.1
Styrene monomer.....	2055	C	
Sulphuric acid.....	1830/1831/1832	C	
Tetra ethyl lead.....	1649	A	.1
Tetrahydro naphthalene.....	1540	C	
Tetramethyl lead.....	1649	A	.1
Toluene.....	1294	C	
Toluene diisocyanate.....	2078	(B)	
Trichloroethane.....		C	
Trichlorethylene.....	1710	B	
Triethylamine.....	1296	C	
Trimethylbenzene.....		(C)	
Tritolyl phosphate (Tricresyl phosphate).....		(B)	
Turpentine (wood).....	1299	B	
Vinyl acetate.....	1301	C	
Vinylidene chloride.....	1303	(B)	
p-Xylene.....	1307	C	
Xylene (mixed isomers).....	1307	C	

¹ Brackets in col. II indicate that the category shown has been provisionally assigned and that further data is needed in order to complete the evaluation of the hazard of the substance concerned.

APPENDIX III

LIST OF OTHER LIQUID SUBSTANCES CARRIED IN BULK

Acetone	Fatty alcohols (C ₁₂ -C ₂₀)
Acetonitrile (Methyl cyanide)	Formic acid
Adiponitrile	Glycerine
Alum (15 % solution)	n-Heptane
Aminoethylethanolamine (Hydroxy-ethylenediamine) ¹	Heptanoic acid ¹
n-Amyl alcohol	Heptene (mixed isomers)
tert-Amyl alcohol	n-Hexane
Benzyl alcohol	Hydrochloric acid
n-Butyl acetate	Isopentane
sec-Butyl acetate	Isophorone
iso-Butyl acrylate	Isoprene
n-Butyl acrylate	Isopropyl acetate
iso-Butyl alcohol	Isopropyl alcohol
n-Butyl alcohol	Lactic acid
Butylene glycol (s)	Ligroin
iso-Butyl methacrylate	Liquid sulphur
Butyl methacrylate	Methyl acetate
Butyrolactone	Methyl alcohol
Calcium chloride (solution)	Methylamyl acetate
Calcium hydroxide (solution)	Methylamyl alcohol
Castor oil	Methyl cyanide
Chlorohydrins (crude) ¹	Methyl ethyl ketone (2-butanone)
Citric acid (10%-25%)	Methyl iso-butyl ketone
Citric juices	Methyl methacrylate
Coconut oil	2-Methylpentene ¹
Cod liver oil	alpha-Methylstyrene ¹
Cyclohexanol	Milk
Cyclohexanone	Molasses
Cyclohexylamine ¹	Monoethanolamine
p-Cymene (iso-Propyltoluene) ¹	Monethylene glycolmonoethyl ether (Methyl cellosolve)
Decahydronaphthalene (Decalin) ¹	Monopropylene glycol
Decane ¹	Morpholine ¹
iso-Decyl alcohol	2-Nitropropane
n-Decyl alcohol	iso-Octane ¹
Decyl octyl alcohol	Olive oil
Diacetone alcohol ¹	Oxalic acid (10-25%)
Dibutyl ether	Phosphoric acid
Diethanolamine	Polypropylene glycol
Diethyl ether	Propionaldehyde
Diethylene glycol	Propionic acid
Diethylketone (3-Pentanone)	Propionic anhydride
Di-iso-butylene ¹	n-Propyl alcohol
Di-iso-butyl ketone	iso-Propyl cyclohexane
Di-iso-propyl ether ¹	Propylene oxide
Dimethyl formamide (Form-dimethyl-amide)	Propylene tetramer
Dipentene	Propylene trimer
Diphenyl/Diphenyloxide mixtures ¹	Silicon tetrachloride
Dipropylene glycol	Sorbitol
2-Ethoxyethyl acetate ¹	Tallow
Ethyl acetate	Tetrahydrofuran
Ethyl acrylate	Tetramethylbenzene
Ethyl alcohol	Titanium tetrachloride
Ethyl cyclohexane	Tridecanol
Ethylene chlorohydrin (2-Chloro-ethanol) ¹	Triethanolamine
Ethylene cyanohydrin ¹	Triethylene glycol
Ethylene glycol	Triethylenetetramine
2-Ethylhexyl acrylate ¹	Tripropylene glycol
Ethyl lactate ¹	Water
	Wine

¹ Indicates that the substance has been provisionally included in this list and that further data is necessary in order to complete the evaluation of its environmental hazards, particularly in relation to living resources.

APPENDIX IV

CARGO RECORD BOOK ²³

Name of ship_____

Cargo carrying capacity of each tank in cubic metres_____

Voyage from_____to_____

(a) Loading of cargo

1. Date and place of loading.
2. Name and category (if applicable) of cargo(es) loaded.
3. Identity of tank(s) loaded.

(b) Transfer of cargo during voyage

4. Date of transfer.
5. Identity of tank(s) (i) From _____ (ii) To _____.
6. Was(were) tank(s) in 5(i) emptied?
7. If not, quantity remaining.

(c) Discharge of cargo

8. Date and place of discharge.
9. Identity of tank(s) discharged.
10. Was(were) tank(s) emptied?
11. If not, quantity remaining in tank(s).
12. Is(are) tank(s) to be cleaned?
13. Amount transferred to slop tank.
14. Identity of slop tank.

(d) Ballasting of cargo tanks

15. Identity of tank(s) ballasted.
16. Date and position of ship at start of ballast.

*(e) Cleaning of cargo tanks**Category A substances*

17. Identity of tank(s) cleaned.
18. Date and location of cleaning.
19. Method(s) of cleaning.
20. Location of reception facility used.
21. Concentration of effluent when discharge to reception facility stopped.
22. Quantity remaining in tank.
23. Procedure and amount of water introduced into tank in final cleaning.
24. Location, date of discharge into sea.
25. Procedure and equipment used in discharge into the sea.

Category B and C substances

26. Washing procedure used.
27. Quantity of water used.
28. Date, location of discharge into sea.
29. Procedure and equipment used in discharge into the sea.

(f) Discharge of dirty ballast water

30. Identity of tank(s).
31. Date and position of ship at start of discharge into sea.
32. Date and position of ship at finish of discharge to sea.
33. Ship's speed(s) during discharge.
34. Quantity discharged to sea.
35. Quantity of polluted water transferred to slop tank(s) (identify slop tank(s)).
36. Date and port of discharge into shore reception facilities (if applicable).

(g) Discharge from slop tank/disposal of residue

37. Identity of slop tank(s).
38. Quantity disposed from each tank.
39. Method of disposal of residue:

²³ This is a preliminary draft of a Cargo Record Book which has been inserted only as an indication of the kinds of operations which should be recorded therein. It will therefore require further development.

- (a) Reception facilities.
- (b) Mixed with cargo.
- (c) Transferred to another (other) tank(s) (identify tank(s)).
- (d) Other method.

40. Date and port of disposal of residue.

(h) *Accidental or other exceptional discharge*

- 41. Date and time of occurrence.
- 42. Place or position of ship at time of occurrence.
- 43. Approximate quantity, name and category (if any) of substance.
- 44. Circumstances of discharge or escape and general remarks.

-----Signature of Master

-----Signature of Surveyor (if required)

ANNEX III¹—REGULATIONS FOR THE PREVENTION OF POLLUTION BY HARMFUL SUBSTANCES CARRIED BY SEA IN PACKAGED FORM, OR IN CARGO CONTAINERS OR IN PORTABLE TANKS

REGULATION 1—APPLICATION

(1) Unless expressly provided otherwise, these regulations apply to all ships carrying harmful substances in packaged form or in cargo containers or in portable tanks.

(2) [Such carriage of harmful substances is prohibited except in accordance with the provisions of this Annex.]²

(3) To supplement the provisions of this Annex each Contracting State shall issue, or cause to be issued, detailed instructions on packaging, marking and labelling, documentation, stowage, quantity limitations, discharge by jettisoning and leakages for preventing or minimizing pollution of the marine environment by harmful substances.³

(4) For the purpose of this Annex, empty receptacles, cargo containers and portable tanks which have been used previously for the carriage of harmful substances shall themselves be treated as harmful substances unless adequate precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment.

REGULATION 2⁴—PACKAGING

Packaging, cargo containers and portable tanks shall be adequate to minimize the hazard to the marine environment having regard to their specific contents.

REGULATION 3⁴—MARKING AND LABELLING

Each package, cargo container, or portable tank containing a harmful substance shall be durably marked with the correct technical name (trade names shall not be used), and further marked with a distinctive label or stencil of label, indicating that the contents are harmful. Such identification may be supplemented by any other means, for example by the use of the UN number of the substance assigned by the United Nations Committee.

REGULATION 4—DOCUMENTATION

(1) In all documents relating to the carriage of harmful substances by sea where such substances are named, the correct technical name of the substances shall be used (trade names shall not be used).

¹ Several delegations were of the opinion that this subject has not been considered in sufficient detail to incorporate the provisions of this Annex in the Convention, and therefore suggested that these provisions should be established in the form of recommendations appended to a Conference Resolution. A proposed text of such a Resolution with accompanying Recommendations is shown on page 127 of this document as an addendum to this footnote.

² Some delegations feel this provision is superfluous.

³ See draft Resolution 7.

⁴ Some delegations pointed out that much further work will be required to clarify such aspects as the adequacy of packagings, cargo containers and portable tanks to minimize the hazard to the marine environment (Regulation 2), and the degree of durability required for labels relative to that of the various packagings on which they are to be affixed (Regulation 3).

(2) The shipping documents supplied by the shipper shall include a certificate or declaration that the shipment offered for carriage is properly packed, marked and labelled and in proper condition for carriage to minimize the hazard to the marine environment.

(3) Each ship carrying harmful substances shall have a special list or manifest setting forth the harmful substances on board and the location thereof. A detailed stowage plan which sets out the location of all harmful substances on board may be used in place of such special list or manifest.

(4) In a case where the ship carries a special list or manifest or a detailed stowage plan, required for the carriage of dangerous goods by the International Convention for the Safety of Life at Sea in force, the documents required for the purpose of this Annex shall be combined with those for dangerous goods.

REGULATION 5—STOWAGE

Harmful substances shall be both properly stowed and secured so as to minimize the hazards to the marine environment without impairing the safety of ship and persons on board.

REGULATION 6⁵—QUANTITY LIMITATIONS

Certain harmful substances which are very hazardous to the marine environment shall either be prohibited for carriage or shall be limited as to the quantity which may be carried aboard any one ship. In limiting the quantity due consideration shall be given to size, construction and equipment of the ship as well as the inherent nature of the substance.

REGULATION 7—EXCEPTIONS

(1) Discharge by jettisoning of harmful substances carried in packaged form, or in cargo containers or in portable tanks shall be prohibited except where necessary for the purpose of securing the safety of the ship or saving life at sea.

(2) Subject to the provisions of this Convention appropriate measures based on the physical, chemical and biological properties of harmful substances, shall be taken to regulate the washing of leakages overboard provided that compliance with such measures would not impair the safety of the ship and persons on board.

REGULATION 8—ARRANGEMENTS FOR RECOVERY

Contracting States or groups of Contracting States shall make arrangements to cater for the possible need to recover or otherwise deal with harmful substances which are lost or may be lost into the sea from ships.

REGULATION 9⁶—REPORTS ON INCIDENTS INVOLVING HARMFUL SUBSTANCES

ADDENDUM TO FOOTNOTE 1 OF ANNEX III

DRAFT RESOLUTION—RECOMMENDATION CONCERNING THE PREVENTION OF POLLUTION BY HARMFUL SUBSTANCES CARRIED BY SEA IN PACKAGED FORM, OR IN CARGO CONTAINERS OR IN PORTABLE TANKS

The Conference,

Recognizing a potential hazard to the marine environment which is involved in the carriage of harmful substances by sea in packaged form, or in cargo containers or in portable tanks,

Noting that, whilst recognizing the need to formulate appropriate provisions for inclusion in the International Convention for the Prevention of Pollution from Ships, 1973, the present state of knowledge in this field has not advanced sufficiently enough to enable the Conference to formulate such provisions.

Having agreed upon a series of recommendations relating to the carriage of harmful substances in packaged form, or in cargo containers or in portable tanks, the texts of which appear in the Appendix to this Resolution,

⁵ Some delegations mentioned that this interdiction may interfere with international trade and that actually no scientific or technical reason could justify this interdiction. It was agreed that great care should be exercised when finalizing the text so as to ensure compatibility with the provisions of other Annexes.

⁶ Depending on the final text of Article 7 to be adopted by the Conference there might be a need to include appropriate requirements in this Annex.

Having noted the Regulations relating to the safe carriage of dangerous goods by sea as set out in Chapter VII of the International Convention for the Safety of Life at Sea, 1960, in particular, Regulation 1(d) of that Chapter by which Contracting Governments are obliged to issue, or cause to be issued, detailed instructions for the safe packing and storage of specific dangerous goods or categories of dangerous goods which shall include any precautions necessary in relation to other cargo,

Noting further the International Maritime Dangerous Goods Code which was prepared in implementation of Recommendation 56 of the International Conference on Safety of Life at Sea, 1960, and has been recommended by the Organization as a uniform basis upon which Governments should formulate the national regulations envisaged in Chapter VII of the Safety Convention,

Recognizing that provisions concerning substances discovered to be harmful to the marine environment must be specified and be complementary to those which have been adopted for the carriage of dangerous goods by sea,

Recommends that

(a) the Organization pursue and encourage studies of the impact that the carriage of harmful substances by sea may have upon the marine environment;

(b) the result of such studies be directed towards the revision of the scope of the International Maritime Dangerous Goods Code or the development of a harmful substance code, that takes into account (i) substances that are harmful to the marine environment but which are not classed as dangerous goods; (ii) the minimization of the threat to the marine environment that arises from the carriage by sea of the substances that will be enumerated in such codes; and (iii) safety in maritime transport;

(c) in such revision or development particular account be taken of (i) packaging, (ii) marking and labeling, (iii) documentation, (iv) stowage, (v) quantity limitations, (vi) exceptions, and (vii) arrangements for recovery;

(d) Contracting States consider adoption of the format of the International Maritime Goods Code for the systematic development of regulations and standards for the carriage of harmful substances that represent a threat to the marine environment so as to ensure compatibility between safety requirements and provisions relating to pollution abatement; and

(e) the recommended practices and guidelines in the attached Appendix to this Resolution form the basis for the subsequent development of the provision for inclusion in an Annex to the International Convention for the Prevention of Pollution from Ships, 1973.

Invites Governments

(a) to adopt, pending the development of such Convention provisions, the recommendations contained in the Appendix as a basis for national measures; and

(b) to issue or cause to be issued detailed instructions on packaging, marking and labelling, documentation, storage, quantity limitations, discharge by jettisoning and leakages [and incident reporting procedure], for preventing or minimizing pollution of the marine environment by harmful substances.

APPENDIX TO DRAFT RESOLUTION—RECOMMENDATIONS FOR THE PREVENTION BY HARMFUL SUBSTANCES CARRIED BY SEA IN PACKAGED FORM, OR IN CARGO CONTAINERS OR IN PORTABLE TANKS

RECOMMENDATION 1—APPLICATION

(1) Unless expressly provided otherwise, these recommendations apply to all ships carrying harmful substances in packaged form, or in cargo containers or in portable tanks.

(2) For the purpose of this Appendix empty receptacles, cargo containers and portable tanks which have been used previously for the carriage of harmful substances should themselves be treated as harmful substances unless adequate precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment.

RECOMMENDATION 2¹—PACKAGING

Packaging, cargo containers and portable tanks should be adequate to minimize hazard to the marine environment having regard to their specific contents.

RECOMMENDATION 3¹—MARKING AND LABELLING

Each package, cargo container, or portable tank containing a harmful substance should be durably marked with the correct technical name (trade names should not be used), and further marked with a distinctive label or stencil of label, indicating that the contents are harmful. Such identification may be supplemented by any other means, for example by the use of the UN number of the substance assigned by the United Nations.

RECOMMENDATION 4—DOCUMENTATION

(1) In all documents relating to the carriage of harmful substances by sea where such substances are named, the correct technical name of the substances should be used (trade names should not be used).

(2) The shipping documents supplied by the shipper should include a certificate or declaration that the shipment offered for carriage is properly packed, marked and labelled and in proper condition for carriage to minimize the hazard to the marine environment.

(3) Each ship carrying harmful substances should have a special list or manifest setting forth the harmful substances on board and the location thereof. A detailed stowage plan which sets out the location of all harmful substances on board may be used in place of such special list or manifest.

(4) In a case where the ship carries a special list or manifest or a detailed stowage plan, required for the carriage of dangerous goods by the International Convention for the Safety of Life at Sea in force, the documents required for the purpose of this Appendix should be combined with those for dangerous goods.

RECOMMENDATION 5—STOWAGE

Harmful substances should be both properly stowed and secured so as to minimize the hazard to the marine environment without impairing the safety of ship and persons on board.

RECOMMENDATION 6²—QUANTITY LIMITATIONS

Certain harmful substances which are very hazardous to the marine environment should either be prohibited for carriage or should be limited as to the quantity which may be carried aboard any one ship. In limiting the quantity due consideration should be given to size, construction and equipment of the ship as well as the inherent nature of the substance.

RECOMMENDATION 7—EXCEPTIONS

(1) Discharge by jettisoning of harmful substances in packaged form or in cargo containers or in portable tanks should be prohibited except where necessary for the purpose of securing the safety of the ship or saving life at sea.

(2) Subject to the provisions of the International Convention for the Prevention of Pollution from Ships, 1973, appropriate measures, based on the physical, chemical and biological properties of harmful substances, should be taken to regulate the washing of leakages overboard provided that compliance with such measures would not impair the safety of the ship and persons on board.

RECOMMENDATION 8—ARRANGEMENTS FOR RECOVERY

Contracting States or groups of Contracting States should make arrangements to cater for the possible need to recover or otherwise deal with harmful substances which are lost or may be lost into the sea from ships.

¹ Some delegations pointed out that much further work will be required to clarify such aspects as the adequacy of packagings, cargo containers and portable tanks to minimize the hazard to the marine environment (Recommendation 2), and the degree of durability required for labels relative to that of the various packagings on which they are to be affixed (Recommendation 3).

² Some delegations mentioned that this interdiction may interfere with international trade and that actually no scientific or technical reason could justify this interdiction. It was agreed that great care should be exercised when finalizing the text so as to ensure compatibility with the provisions of other Annexes.

RECOMMENDATION [9]²—REPORTS ON INCIDENTS INVOLVING HARMFUL
SUBSTANCES

ANNEX IV—REGULATIONS FOR THE PREVENTION OF POLLUTION BY SEWAGE
FROM SHIPS

REGULATION 1—DEFINITIONS

For the purpose of this Annex:

(1) "New ship" is as defined in Regulation 1(5) of Annex I of the present Convention, provided however that a reference to the entry into force of the present Convention shall be taken to mean a reference to the entry into force of this Annex.

(2) "Existing ship" is as defined in Regulation 1(6) of Annex I of the present Convention.

(3) "International voyage" is as defined in Regulation 1(8) of Annex I of the present Convention.

(4) "Sewage" means:

(a) drainage and other discharges from any form of toilets, lavatory pans, urinals and WC scuppers;

(b) drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises;

(c) drainage from holds containing living animals; or

(d) other waste waters including those containing the substances described in Regulation 3(1) (b) and (d) of Annex V of the present Convention when mixed with the drainages defined above.

(5) "Holding tank" means a tank used for the collection and storage of sewage.

(6) "Nearest land" is as defined in Regulation 1(9) of Annex I of the present Convention.

REGULATION 2—APPLICATION

The requirements of this Annex shall apply to:

(a) new ships of more than 200 tons gross tonnage¹ and new ships which do not have a measured gross tonnage but which have beds for more than 10 persons; and

(b) existing ships of more than 200 tons gross tonnage¹ and existing ships which do not have a measured gross tonnage but which have beds for more than 10 persons, [10]² years after the date of entry into force of this Annex.³

REGULATION 3—CERTIFICATE AND SURVEY

(1) An International Sewage Pollution Prevention Certificate (1973),⁴ when issued to a ship engaged on international voyages, shall be of a form which corresponds to that of the model given in the Appendix to this Annex.

(2) Such Certificate shall be issued either by the Administration or by any person or organization duly authorized by it. In every case the Administration assumes full responsibility for the Certificate.

(3) (a) A Contracting Government may, at the request of another Contracting Government, cause a ship to be surveyed and, if satisfied that the provisions of this Annex are complied with, shall issue or authorize the issue of an International Sewage Pollution Prevention Certificate (1973) to the ship in accordance with this Annex.

(b) A copy of the certificate and a copy of the survey report shall be transmitted as early as possible to the requesting Government.

(c) A certificate so issued shall contain a statement to the effect that it has been issued at the request of the Government of the State whose flag the ship is

² Depending on the final text of Article 7 to be adopted by the Conference there might be a need to include appropriate recommendations in this Appendix.

¹ Some delegations suggested that the number of persons admitted on board is a reasonable criteria additional to gross tonnage and paragraph (a) therefore should read: "(a) new ships of more than 200 tons gross tonnage and new ships of not more than 200 tons gross tonnage or which do not have a measured gross tonnage but which are designed to have on board more than [10] persons; and"

² Some delegations were of the opinion that this period was too long and should be reduced to 5 years.

³ Some delegations suggested that provision should be made to enable Administrations to exempt certain passenger ships from the requirements of this Annex if it is satisfied that the application of those requirements would be neither reasonable nor practicable.

⁴ Some delegations considered that the survey and issue of certificates should be made mandatory to ships engaged on international voyages.

entitled to fly, and it shall have the same force and receive the same recognition as the certificate issued under paragraph (2) of this Regulation.

(d) No International Sewage Pollution Prevention Certificate (1973) shall be issued to a ship which is not a Contracting Government.

(4) The Certificate shall be drawn up in the official language or languages of the issuing country. If the language used is neither English nor French, the text shall include a translation into one of these languages.

(5) The Certificate shall be issued after the survey to a ship to ensure that it is equipped with:

(a) suitable equipment to the satisfaction of the Administration to collect and hold sewage or to treat the sewage so as to be able to meet the requirements of Regulation 4(1) (b) of this Annex; and

(b) a pipeline leading to the exterior convenient for the discharge of sewage to a reception facility,⁵ and that such a pipeline is fitted with a standard shore connection in compliance with Regulation 7 of this Annex.

(6) The survey of the ship as regards enforcement of the provisions of this Annex shall be carried out by officers of the Administration. The Administration may, however, entrust the survey either to surveyors nominated for the purpose or to organizations recognized by it. In every case the Administration concerned fully guarantees the completeness and efficiency of the survey.

(7) After any survey of the ship under this Regulation has been completed, no change shall be made in the items covered by the survey without the sanction of the Administration, except for the maintenance and repair of installed equipment.

(8) An International Sewage Pollution Prevention Certificate (1973) shall be issued for a period specified by the Administration, which shall not exceed five years from the date of issue.

REGULATION 4—DISCHARGE OF SEWAGE⁶

(1) Subject to the provisions of Regulation 5 of this Annex, the discharge of sewage into the sea is prohibited, except when:⁷

(a) the ship is discharging at a distance of more than ———⁸ nautical miles from the nearest land, provided that sewage that has been stored in holding tanks shall not be discharged instantaneously but at a moderate rate when the ship is en route and proceeding at not less than 4 knots; or

(b) the ship has in operation suitable sewage treatment equipment as defined in Regulation 3(5) (a) which can satisfy the following criteria:

(i)⁹ The total coliform count of the effluent shall not exceed [10,000] per litre,¹⁰ and

(ii)¹¹ The effluent shall not produce visible floating solids in, nor cause discoloration of, the surrounding water; or

(c) the ship is situated in the waters of a State and is discharging sewage in accordance with such less severe requirements as may be imposed by such State.¹²

(2) When the sewage is mixed with wastes or waste water having different discharge requirements specified in Annex V of the present Convention, the more severe discharge requirements shall apply.

⁵ One delegation doubted whether the pipeline should in all cases be a mandatory requirement for the issue of a certificate.

⁶ One delegation suggested that consideration should be given to inclusion of special requirements for fixed platforms.

⁷ Some delegations suggested the insertion of the following words at the beginning of this sentence "Without prejudice to more stringent regulations which a coastal State may make [within the limits of national jurisdiction/in respect of areas under its jurisdiction/in respect of waters under its jurisdiction]."

⁸ No clear majority could be reached with respect to any particular distance from land. Furthermore, the scientific information available indicated that, in view of the large number of variable factors involved, it would not be possible to establish a particular distance on a scientific basis only. It appears, however, that this would probably fall within 12 miles from the nearest land.

⁹ Several delegations were of the opinion that the words "under test conditions" should be inserted at the beginning of the sub-paragraph.

¹⁰ Some delegations proposed the inclusion of BOD as a criterion. Other delegations felt that the coliform criteria should not be included.

¹¹ Some delegations were of the opinion that the words "when in operation aboard ship" should be inserted at the beginning of the sub-paragraph.

¹² Some delegations felt that the text of this sub-paragraph might need to be reviewed when the distance from the nearest land in sub-paragraph (a) of this Regulation has been established. Other delegations were of the opinion that this sub-paragraph should be deleted.

REGULATION 5—EXCEPTIONS

Regulation 4 of this Annex shall not apply to :

(a) the discharge of sewage from a ship necessary for the purpose of securing the safety of a ship and its personnel or saving life at sea ;¹³

(b) the escape of sewage resulting from damage to a ship or its equipment if all reasonable precautions have been taken for the purpose of preventing or minimizing the escape.

REGULATION 6—RECEPTION FACILITIES

Each Contracting Government shall take appropriate steps to ensure that ports shall be provided with facilities adequate for the reception, without causing undue delay to ships, of any sewage that remains on board the ship for disposal.

REGULATION 7—STANDARD SHORE CONNECTION

To enable pipes of shore and floating reception facilities to be connected with the ship's pipe discharge line, if provided, both lines shall be fitted with a standard shore connection in accordance with the following table :

[TABLE TO BE DEVELOPED]¹⁴

¹³ Some delegations preferred a broader exception and proposed the addition of the following "or of avoiding damage to a ship or its cargo".

¹⁴ It was noted that the French delegation had indicated that the Table of dimensions was being prepared and would be available prior to the Conference.

APPENDIX

International Sewage
Pollution Prevention Certificate (1973)

(Official Seal)

Issued under the Provisions of the International Convention for the Prevention of Pollution from Ships, 1973, under the Authority of the Government of

by
(full designation of the country)

.....
(full designation of the competent person or organization recognized under the provisions of the International Convention for the Prevention of Pollution from Ships, 1973)

Name of Ship	Distinctive Number or Letter	Port of Registry	Gross Tonnage

Type of ship.....
No. of beds on board (if no gross tonnage figure is quoted)^{15/}.....
Date of which keel was laid or ship was in a similar stage of construction.....
Date of building contract or date of conversion.....
Date of delivery.....

^{15/} See footnote ^{1/} under Regulation 2.

The actual wording is conditional on decision taken on Regulation 2.

This is to certify that:

(1) The ship is equipped with

(a) a.....to:
(Description of equipment used)

(i) collect and hold the sewage*

(ii) treat the sewage so as to be able to meet the requirements of Regulation 4(1)(b) of Annex IV of the said Convention.*

(b) a pipeline for the discharge of sewage to a reception facility, and that such pipeline is fitted with a standard shore connection in compliance with Regulation [7] of Annex IV of the above said Convention 16/

(2) The ship has been surveyed in accordance with the provisions of Annex IV to the International Convention for the Prevention of Pollution from Ships, 1973, concerning the Prevention of Pollution by Sewage, and that the survey showed that the ship complied with the applicable requirements of Annex IV of the said Convention.

This Certificate is valid until theday of
..... 19

Issued at
(Place of issue of certificate)

..... 19.....
(Date of issue)

.....
(Signature of official issuing the certificate and/or seal of issuing authority)

If signed, the following paragraph is to be added:

The undersigned declares that he is duly authorized by the said Government to issue this Certificate.

* Delete as appropriate

16/ See Footnote 5 in Regulation 3(5)(b).

ANNEX V—REGULATIONS FOR THE PREVENTION OF POLLUTION BY GARBAGE FROM SHIPS

REGULATION 1—DEFINITIONS

(1) "Garbage" means all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention.

(2) "Nearest land" is as defined in Regulation 1(9) of Annex I of the present Convention.

REGULATION 2—APPLICATION

The requirements of this Annex shall apply to all ships.

REGULATION 3—DISCHARGE OF GARBAGE¹

(1) Subject to the provisions of this Annex:²

(a) the discharge into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets and plastic garbage bags is prohibited;

(b) the discharge into the sea of food wastes is prohibited within a distance of [3]³ nautical miles from the nearest land;

(c) the discharge into the sea of wood dunnage, lining and packing materials which will continue to float, is prohibited:

(i) within a distance of [25]⁴ nautical miles from the nearest land; and

(ii) [anywhere within special areas];⁵

(d) the discharge into the sea of all other garbage including paper, rags, glass, metal, bottles, crockery, and similar refuse is prohibited:⁶

(i) within a distance of [12] nautical miles from the nearest land; and

(ii) [anywhere within special areas].⁵

(2) When the garbage is mixed with waste or waste water having different discharge requirements specified in Annex IV of the present Convention the more severe discharge requirements shall apply.

REGULATION 4—EXCEPTIONS

Regulation 3 of this Annex shall not apply to:

(a) the discharge of garbage from a ship necessary for the purpose of securing the safety of a ship and its personnel, or saving life at sea;⁷

(b) the escape of garbage resulting from damage to a ship provided all reasonable precautions have been taken after the occurrence of the damage for the purpose of preventing or minimizing the escape; and

(c) the accidental loss of synthetic fishing nets or synthetic material incidental to the repair of such nets, provided that all reasonable precautions have been taken to prevent such loss.

REGULATION 5—RECEPTION FACILITIES

Each Contracting Government shall take appropriate steps to ensure that ports shall be provided with facilities adequate for the reception of garbage without causing undue delay to ships.

¹ One delegation suggested that consideration should be given to inclusion of special requirements for fixed platforms.

² Some delegations suggested that the insertion of the following words at the beginning of this sentence: "Without prejudice to more stringent regulations which a coastal State may make [within the limits of national jurisdiction/in respect of access under its jurisdiction/in respect of waters under its jurisdiction]".

³ Two delegations pointed out that this criterion might cause difficulty to some countries in relation to existing national regulations and they would prefer a figure of 12 nautical miles.

⁴ Some delegations expressed a preference for a distance of 50 miles from the nearest land.

⁵ These areas have yet to be defined. Some delegations pointed out that such areas should not be established until it has been ensured that adequate reception facilities can be made available in the countries concerned.

⁶ Some delegations felt that the types of garbage mentioned in sub-paragraph (d) could, if passed through a comminuter or grinder, be discharged under the same conditions as those mentioned in sub-paragraph (b) of this Regulation.

⁷ Some delegations preferred a broader exception and proposed the addition of the following: "or of avoiding damage to a ship or its cargo".

INTER-GOVERNMENTAL MARITIME CONSULTATIVE ORGANIZATION,
MARCH 8, 1973

PREPARATORY MEETING FOR THE INTERNATIONAL CONFERENCE ON MARINE POLLUTION,
1973—February 12–March 2, 1973—Agenda item 8

REPORT OF THE PREPARATORY MEETING TO THE MARITIME SAFETY COMMITTEE

Draft resolutions relating to the prevention and control of marine pollution

Attached hereto are the draft texts of seven Resolutions relating to the prevention and control of marine pollution which have been prepared by the Preparatory Meeting during its consideration of the draft text of the International Convention for the Prevention of Pollution from Ships, 1973.

Subject to approval by the Maritime Safety Committee, the drafts will be incorporated in a working document and issued under Agenda item 6 of the Conference.

Draft Resolution 1

IMPLEMENTATION OF THE 1969 AMENDMENTS TO THE INTERNATIONAL CONVENTION
FOR THE PREVENTION OF POLLUTION OF THE SEA BY OIL, 1954

The Conference,

Noting its main objectives as set out in Resolution A.237(VII) adopted by the Assembly of the Organization on 12 October 1971, as being the achievement, by 1975 if possible but certainly by the end of the decade, of the complete elimination of the wilful and intentional pollution of the seas by oil and noxious substances other than oil and the minimization of accidental spillages,

Noting further Recommendation 86 of the United Nations Conference on the Human Environment 1972 which called upon Governments to participate fully in the present Conference as well as in other efforts with a view to bringing all significant sources of pollution within the marine environment under appropriate controls, including in particular, the complete elimination of deliberate pollution by oil from ships with the goal of achieving this by the middle of the present decade,

Recognizing the importance of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as being the first international instrument to be concluded with the prime objective of protecting the environment, and appreciating the significant contribution which that Convention has made in preserving the seas and coastal environment from pollution.

Noting the Amendments to that Convention, set out in Resolution A.175(VI) adopted by the Assembly of the Organization on 21 October 1969, and considering that the implementation of those amendments would be a major step towards the complete elimination of oil pollution and would bring about a significant reduction in the total quantity of oil reaching the sea,

Believing that the International Convention for the Prevention of Pollution of the Sea from Ships, 1973, which was concluded by the present Conference will, when implemented, achieve its stated objective of completely eliminating intentional pollution by oil and other noxious substances from ships,

Being aware that some lapse of time will inevitably occur before the 1973 Convention can enter into force,

Urges Governments which have not yet accepted the 1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, to do so as a matter of urgency without awaiting the entry into force of the International Convention for the Prevention of Pollution from Ships, 1973.

Draft Resolution 2

DEVELOPMENT OF SCIENTIFIC INFORMATION ON WATER QUALITY CRITERIA

The Conference,

Recognizing that the capacity of the sea to assimilate pollutants and render them harmless is limited and that its ability to regenerate natural resources is also limited,

Believing that the adequacy of measures taken to prevent pollution of the sea by substances that are liable to create hazards to human health, to harm marine

life, to damage amenities or to interfere with other legitimate uses of the sea needs to be kept under review,

Believing also that there is a need to organize all interested competent organizations in establishing methods whereby the needs of the marine environment relative to water quality can be established, to identify the sources of pollution and to continually assess the various methods of controlling marine pollution for the development of new or more effective control measures where appropriate,

Recommends that the Organization should co-operate with other organizations to achieve these aims whereby a first step might be to establish water quality criteria for the protection of the marine environment.

Draft Resolution 3

RECOMMENDATION CONCERNING THE CONVENTIONS PROVISIONS RELATING TO THE CARRIAGE IN BULK OF NOXIOUS SUBSTANCES OTHER THAN OIL

The Conference,

Having noted the Regulations relating to the design, construction and equipment of chemical tankers contained in Annex II of the International Convention for the Prevention of Pollution of the Sea from Ships, 1973, in particular Regulation 11(2) of that Annex by which Contracting Governments are obliged to issue, or to cause to be issued, detailed instructions on the design, construction and equipment of such chemical tankers in order to ensure compliance with Regulation 2(1) of that Annex,

Noting further Regulation 11(3) of that Annex which requires that the detailed instructions shall contain at least all the provisions given in the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk ("the Bulk Chemical Code") adopted by the Assembly of the Organization on 12 October 1971 in Resolution A.212(VII).

Noting also that the Organization has prepared an approach to modification of the Bulk Chemical Code to include marine pollution prevention,

Desiring the formulation of appropriate provisions for the carriage of noxious liquid chemicals in bulk in non-propelled vessels and in deep tanks of dry cargo ships,

Recommends that the Organization:

(a) amends the Bulk Chemical Code as early as possible in order to include requirements necessary from the marine pollution prevention point of view;

(b) keeps the Code under constant review with regard to prevention of marine pollution, taking into account both experience and future development of technology; and

(c) develops with priority Codes for the carriage of noxious liquid chemicals in non-propelled vessels and in deep tanks of dry cargo ships.

Draft Resolution 4

PROCEDURES AND ARRANGEMENTS FOR THE DISCHARGE OF NOXIOUS SUBSTANCES INTO THE SEA

The Conference,

Having adopted, in pursuance of its main objectives, the International Convention for the Prevention of Pollution from Ships, 1973, which, *inter alia*, contains in Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk.

Noting in particular, Regulation 5 of Annex II by which the discharge of noxious liquid substances of Categories A, B and C of ballast water, tank washings or other residues or mixtures containing such substances will be prohibited except in compliance with specified conditions including procedures and arrangements which shall be such as to assure the Administration that the criteria specified for each Category will be met,

Desiring to facilitate international trade by ensuring, as far as possible, the uniform implementation of Annex II,

Recommends that the Organization should ensure that the necessary studies concerning the procedures and arrangements referred to in Regulation 5 of Annex II are undertaken with a view to providing a uniform basis for the guidance of Contracting Governments in approving them.

Draft Resolution 5

RECOMMENDATION CONCERNING THE PREVENTION OF POLLUTION BY NOXIOUS SOLID SUBSTANCES CARRIED IN BULK

The Conference,

Noting that the International Convention for the Prevention of Pollution from Ships, 1973, contains in Annex II, Regulations for the control of pollution by noxious liquid substances in bulk which are framed to eliminate or minimize the intentional or accidental pollution by such substances,

Recognizing a potential hazard to the marine environment which is also involved in the carriage of noxious solid substances in bulk by ships,

Recognizing also a possible need to formulate appropriate provisions for inclusion in the International Convention for the Prevention of Pollution from Ships, 1973,

Noting however that the present state of knowledge in this field has not advanced sufficiently to enable the Conference to formulate such provisions,

Recommends that:

(a) the Organization pursue and encourage studies of the impact that the carriage of noxious solid substances in bulk by ships may have upon the marine environment and on the measures for minimizing the threat to the marine environment which arises from the carriage of such substances;

(b) the results of such studies be directed towards the development of the appropriate provisions relating to the control of pollution by noxious solid substances carried in bulk for inclusion in the International Convention for the Prevention of Pollution from Ships, 1973.

Invites Governments:

(a) to forward reports of incidents involving noxious solid substances carried in bulk by ships to the Organization pending development of the regulations of the 1973 Convention;

(b) to issue, or cause to be issued, such national instruction as may be necessary to minimize any harmful effect of transporting noxious solid substances in bulk on the environment.

Draft resolution 6

RECOMMENDATION CONCERNING THE PREVENTION OF POLLUTION BY LIQUEFIED OR COMPRESSED GASES CARRIED IN BULK

The Conference,

Noting that the International Convention for the Prevention of Pollution from Ships, 1973, contains in Annex II regulations for the control of pollution by noxious liquid substances in bulk which are framed to eliminate or minimize the intentional or accidental pollution by such substances,

Recognizing a potential hazard to the environment in general which is also involved in the carriage of liquefied or compressed gases in bulk by ships,

Noting also that the Organization has under preparation a Code for the Construction and Equipment of Ships Carrying Dangerous Liquefied or Compressed Gases in Bulk ("the Gas Carrier Code"),

Recommends that:

(a) The Organization should use all its endeavours to bring the Gas Carrier Code to the earliest possible completion; and

(b) Contracting Governments, following the finalization of the Gas Carrier Code, should issue or cause to be issued such national instructions as may be necessary to minimize any harmful effect of transporting liquefied or compressed gases in bulk on the environment.

Draft Resolution 7

RECOMMENATION CONCERNING THE PREVENTION OF POLLUTION BY HARMFUL SUBSTANCES CARRIED BY SEA IN PACKAGED FORM, CARGO CONTAINERS OR IN PORTABLE TANKS

The Conference,

Noting the Regulations set forth in Annex III of the International Convention for the Prevention of Pollution from Ships, 1973, relating to the carriage of harmful substances by sea in packaged form, or in cargo containers or in portable tanks, in particular Regulation 1(3) of that Annex by which Contracting States are obliged to issue, or to cause to be issued, detailed instructions on packaging, marking and labelling, documentation, stowage, quantity limitations, jettisoning

and leakages, incident reporting procedure, for preventing or minimizing pollution of the marine environment,

Having noted the Regulations relating to the safe carriage of dangerous goods by sea as set out in Chapter VII of the International Convention for the Safety of Life at Sea, 1960, in particular Regulation 1(d) of that Chapter by which Contracting Governments are obliged to issue, or cause to be issued, detailed instructions for the safe packing and stowage of specific dangerous goods or categories of dangerous goods which shall include any precautions necessary in relation to other cargo,

Noting further the International Maritime Dangerous Goods Code which was prepared in implementation of Recommendation 56 of the International Conference on Safety of Life at Sea, 1960, and has been recommended by the Organization as a uniform basis upon which Governments should formulate the national regulations envisaged in Chapter VII of the 1960 Safety Convention.

Recognizing that provisions concerning substances discovered to be harmful to the marine environment must be specified and be complementary to those which have been adopted for the carriage of dangerous goods by sea,

Recommends that :

(a) the Organization pursue and encourage studies of the impact that the carriage of harmful substances by sea may have upon the marine environment ;

(b) the results of such studies be directed towards the revision of the scope of the International Maritime Dangerous Goods Code or the development of a harmful substance code,

(i) that takes into account substances that are harmful to the marine environment but which are not classed as dangerous goods ;

(ii) the minimization of the threat to the marine environment that arises from the carriage by sea of the substances that will be enumerated in such codes ; and

(iii) safety in maritime transport ;

(c) in such revision or development particular account be taken of : (i) packaging, (ii) marking and labelling, (iii) documentation, (iv) stowage, (v) quantity limitations, (vi) exceptions, and (vii) arrangements for recovery ;

(d) Contracting States consider adoption of the format of the International Maritime Dangerous Goods Code for the systematic development of regulations and standards for the carriage of harmful substances that represent a threat to the marine environment so as to ensure compatibility between safety requirements and provisions relating to pollution abatement ; and

(e) such particulars as referred to above in this paragraph form the basis for the further development of the provisions of the Regulations contained in Annex III of the 1973 Convention.

INTER-GOVERNMENTAL MARITIME CONSULTATIVE ORGANIZATION, FEBRUARY 21, 1973

PREPARATORY MEETING FOR THE INTERNATIONAL CONFERENCE ON MARINE POLLUTION, 1973—FEBRUARY 12—MARCH 2, 1973—AGENDA ITEM 3

MINIMIZATION OF ACCIDENTAL SPILLAGES OF OIL AND OTHER NOXIOUS SUBSTANCES FROM SHIPS

Draft Resolution

INTENTIONAL POLLUTION OF THE SEA AND ACCIDENTAL SPILLAGES

The Conference,

Noting that it was assigned the two following objectives by Resolution A. 237 (VII), adopted by the Assembly of the Inter-Governmental Maritime Consultative Organization on 12 October 1971,

(1) the complete elimination of willful and intentional pollution of the sea by oil and noxious substances other than oil, and

(2) the minimization of accidental spills ;

these objectives to be achieved by 1975, if possible, but certainly by the end of the decade ;

Recognizing that primarily, it has been as a result of extensive preparatory work within the Organization that the Conference has been able to prepare and open for signature

(a) the International Convention for the Prevention of Pollution from Ships, 1973; and

(b) the Protocol relating to Intervention on the High Seas in Cases of Marine Pollution by Substances other than Oil.

the implementation of which should result in the achievement of the first objective but which only deals partially with the second objective;

Recognizing also that considerable progress has been made by the Organization in furtherance of the second objective, by developing proposed international rules and standards directed towards, or contributing to, the prevention, mitigation and minimization of accidental pollution, including the prevention of accidents to ships, minimization of spillages after accident and mitigation of damages after spillages;

Recognizing further that a considerable amount of work in this field leading to the formulation of, and amendments to, conventions for which the Organization is depositary, and other instruments relating to ship safety and prevention of pollution, has yet to be accomplished;

Recommends that the Organization pursue and encourage studies relating to pollution abatement in the marine environment such as:

(a) collection of scientific data on the identification of harmful substances transported by ships;

(b) collection of ship casualty statistics particularly those relating to very large tankers; and

(c) analysis of such casualty data including the interrelationship of average tanker size and age with incidents and magnitude of pollution casualties;

Recommends further that the Organization continue its work with a high priority on the development of measures for the minimization of accidental spillages, particularly those relating to:

(a) Prevention of accidents to ships including

(i) safe navigational procedures and traffic separation schemes for the prevention of collisions, strandings and groundings, this to include the ultimate development of international standards for navigation aids;

(ii) watchkeeping practices in port and at sea and the training and certification of seamen;

(iii) provision of modern navigational and communications equipment;

(iv) the operational procedures during the transfer, loading and unloading of oil and other noxious substances;

(v) maneuverability of large ships;

(vi) construction and equipment of ships carrying oil or other noxious substances; and

(vii) safe carriage of dangerous goods in packages and containers;

(b) Minimization of the risk of escape of oil and other noxious substances in the event of maritime accidents including facilitation of transfer of cargo in the event of accidents;

(c) Minimization of pollution damage to the marine environment including development of appropriate cleaning, retrieval and other similar procedures; with a view to having appropriate action taken by way of the adoption and implementation at an early date of amendments to existing conventions relating to safety at sea and prevention of pollution or of new conventions as appropriate.

EFFECTS OF OIL POLLUTION ON THE MARINE ECOSYSTEM

ACKNOWLEDGMENT

The information contained herein is taken from a literature survey conducted by the special interagency task force for the development of an environmental impact statement for the proposed trans-Alaska pipeline (Volume IV), United States Department of the Interior, 1972.

EFFECTS OF OIL ON MARINE ECOSYSTEMS

Pollution of the ocean by oil is a world-wide problem of growing concern to many nations. The magnitude of the problem is recognized by international organizations of governments and of industry, and has been the subject of several national and international conferences in recent years. The sources of oil in the marine environment have been studied by the Massachusetts Institute of Technology (1970) and by the U.S. Coast Guard (1972; see also Marine Transportation in volume 3 of this statement).

Hydrocarbons are not foreign to the marine environment; they are synthesized by most, if not all, living organisms. Unicellular algae can produce normal paraffin hydrocarbons from carbon dioxide, water and nutrients; paraffinic hydrocarbons are found in most living organisms of the sea (Clark, 1966; Clark and Blumer, 1967).

There are certain characteristic differences, however, between biologically produced hydrocarbons and pollution hydrocarbons, both in the distribution of various hydrocarbon classes and in the molecular size of the hydrocarbons. Crude oil and petroleum products are complex mixtures that contain molecules of different sizes in a fairly even distribution whereas living organisms utilize specific biosynthetic pathways that lead to specific hydrocarbon size groups (Personal communication to D. R. Evans from R. C. Clark, Jr., 1971).

Hydrocarbons are fat soluble and thus have the potential to be retained and accumulated in organisms (Blumer, et al, 1970, p. 17). The major hydrocarbon components in crude oil and in petroleum products can be classified with reference to known biological effects. These are summarized below.

Low-boiling, saturated hydrocarbons are related to the fat-soluble anaesthetics and have a narcotic effect on a wide variety of animals. In lower animals at low concentrations they often cause sleep or reversible insensibility. At higher concentrations they often cause cell damage and death, especially in larval and juvenile stages of marine organisms. The solubility of these low-molecular-weight hydrocarbons in water is of the order of 0.1 to 1.0 gram per liter (100 to 1,000 ppm), comparable to that of many drugs (Goldacre, 1968).

Low-boiling aromatic hydrocarbons comprise the most toxic petroleum fractions. The low-boiling aromatics are acutely poisonous to man and marine organism alike. Benzene, toluene and phenols, such as found in crude oil, produce in man reactions similar to those of alcohol. The initial reaction is restlessness, then excitement, inebriation, drowsiness, depression and sleep. Death may follow from respiratory failure as the concentration rises (Goldacre, 1968). Chronic exposure to low concentrations of some aromatics, especially benzene, may cause bone marrow disease chromosome aberration and leukemia (Finkel, 1960). Low-boiling aromatics, even more water-soluble than the saturates, can cause mortality of marine organisms by contact, even with dilute solutions (Blumer, 1970, p. 3).

Olefinic hydrocarbons are not generally found in crude oils but are plentiful in gasolines and other refined products. The fate of olefins in the marine environment is poorly understood, but this class of compounds is quite reactive and will combine readily with hydrogen, oxygen, chlorine, sulfur and other elements to produce toxic substances. Once incorporated into organisms, olefins remain stable. The full range of olefinic hydrocarbons is reported as likely to interfere with the reception of chemical messengers in the sea by marine organisms (Blumer, 1970, p. 6).

Higher-boiling, saturated hydrocarbons occur naturally in many organisms and, while probably not toxic at low levels, they may interfere with chemoreceptors, the communications system used by some organisms for locating food, responding to sex attractants, and for identifying migration routes (Blumer, 1969, p. 7; 1970, p. 6).

The higher-boiling aromatics act as slower poisons than the lower-boiling aromatic hydrocarbons, but they are equally severe in their effect; in addition some are known to cause cancer! Benzpyrene, 1,2 benzanthracene and alkyl-benzanthracenes have been isolated from crude oil and their carcinogenic effects on animals and man demonstrated (Blumer, 1970, p. 4).

A study of the available information on potential effects of oil pollution reveals more unknowns than proven conclusions. It thus is not at all clear what the acute and long-term effects of oil upon the environment and living marine resources of a region would be. Early reviews of the effects of oil upon bacteria and higher organisms (ZoBell, 1962, p. 85-117) reported no great impact of oil upon fishery resources in general, but are inconclusive because they also reveal incomplete general knowledge, particularly for north temperate, subarctic, and arctic regions. Even fairly recent work, including several studies of the Torrey Canyon, has depended upon on-site visual surveys after occurrence of the oil spill (Nelson-Smith, 1968; Smith, 1968; Simpson, 1968), rather than experiments and detailed study. These investigations have been limited mostly to effects of oil and cleaning or dispersing agents upon primarily adult intertidal organisms and populations. While these observations have contributed more understanding

of the gross effects of oil, they have been unable to answer important basic questions on the effect of pollutant hydrocarbons in the marine environment.

Data gathered from on-site surveys of an oil spill, while descriptive of the effects of that spill, must be applied to other situations with caution. Straughan (1969, p. 369) reporting on investigations of the Santa Barbara oil spill noted factors unique to that incident: (1) the long history of natural oil seepage in the Santa Barbara Channel, and (2) unusually heavy winter-run-off at the time of the spill which reduced salinities, increased sedimentation, and increased DDT in the channel. R. L. Kolpack (Personal communication cited in Kanter, et al, 1970, p. 487) noted that Santa Barbara crude oil is relatively insoluble in seawater and contains a very low percentage of light aromatic compounds. Thus, information gathered on the effects of the Santa Barbara spill are of limited utility in predicting the ecological effects of spills of other oils in other areas.

Lewis (1970, p. 6) commenting on approaches to the study of chronic pollution contends "... that without a massive expansion of ecological and reproductive data by simultaneous multi-disciplinary studies not only will we be unable to detect the significant long-term changes, but we will even remain unaware of the most suitable or important species and methods to build into a monitoring program." He notes our general lack of understanding of community structure and population dynamics which severely limits the interpretation of data and our predictive ability.

Copeland (1970, p. 831), discussing the response of ecological systems to stress, suggests the principle that "... these systems already subjected to energy requiring stresses, are more likely to resist the changes than these (such as tropical systems) adapted to relatively constant environments." He concludes that estuarine ecosystems composed of organisms capable of wide adaptations and generalizations, such as north temperate systems, would be relatively unaffected by the same magnitude of disturbance that would drastically alter a tropical system. Odum (1970, p. 840) notes, however, that many estuarine species are living near the limit of their tolerance range and that any alteration in the environment, such as additional stresses caused by low levels of pollution or by decreased oxygen concentrations, could exclude these animals permanently from the estuary.

Studies of the effects of chronic low-level pollution upon subadult, larval and egg stages and the causes for changes in survival are extremely limited. Simply measuring plankton volume or counting species to evaluate the impact of an oil spill may not detect the physiological effects. Holmes (1969, p. 26) commenting upon his own observations that phytoplankton abundance and species composition were not much changed following the Santa Barbara oil spill noted. " * * * the effects of oil pollution upon the phytoplankton cannot be detected with the methods employed." Natural fluctuations of both vertebrate and invertebrate population levels often are such that qualitative or crude quantitative observations of a biological community might only reveal normal conditions unless a very large change was observed to correlate with the spill.

Because petroleum and petroleum products are toxic chemicals, to understand the action of these pollutants it is essential to utilize the resources of biochemistry and biophysics (Blumer, 1970, p. 13; FAO, 1970). Chemical pollution of the tissues of organisms can be detected by advanced analytic methods such as are employed by Blumer, Souza, and Sass (1970), and this work is opening new vistas of understanding of the effect of oil. The work of these latter authors suggests that the consequences of pollutant hydrocarbons in marine ecosystems is as yet not understood.

Blumer's (1969, p. 10) studies on the fate of organic compounds in the marine food chain found that hydrocarbons, once they are incorporated into a particular marine organism, are stable, regardless of their structure, and that they may pass through many members of the marine food chain without alteration and may actually be concentrated in tissue. This is a situation similar to the chlorinated hydrocarbon group of pesticides, which concentrate in the marine food chain to the point where toxic levels are reached.

The entrance of oil-derived hydrocarbons into marine food chains is evident. Smith (1968, p. 49) reported that the presence of oil and benzene-ring compounds in the feces of limpets browsing on an oily deposit has been demonstrated chemically; similar observations have been made on top-shells, *Monodonta*, and limpets, *Patella*, living on oily rocks at Perranuthnoe. He reported, "the proportion of oil in material ingested by these animals was estimated as about 20-30 percent in *Patella* and 5-50 percent in *Monodonta*." Smith (1968, p. 65) believed it unlikely that any food value to the browser is derived from such feeding ac-

tivity. However, such feeding activity does concentrate hydrocarbons in organisms that in turn are eaten by larger animals and the oil thus enters the food chain.

Large amounts of tar were found in the stomachs of three saury, *Scomberesox saurus*, from a sample of ten in the Mediterranean Sea near Gibraltar by Horn, et al (1970, p. 246). Although these authors note that the saury is said to feed upon small crustaceans and perhaps upon small fish, they also note that "vegetable debris" was found in the stomach of one saury, which suggested the species is not a very discriminate feeder. They point out, however, that because this fish is fed upon by porpoises and larger predaceous fishes, a direct introduction into the ocean food web of material known to be toxic occurs. Mironov (1968, p. 336) notes the ability of some zooplankton organisms to accumulate hydrocarbons, assuring exposure at all trophic levels.

Some doubt may remain as to the direct carcinogenicity of crude oil and crude oil residues in marine organisms according to Blumer (1969, p. 9) but evidence pointing toward this is accumulating (Blumer, 1970, p. 4). A literature search and evaluation conducted for the U.S. Coast Guard by Battelle Memorial Institute (1967, pp. 6-19) noted that shellfish, although alive, may be unfit for consumption because of the carcinogenic hydrocarbon 3, 4-benzpyrene found in their bodies. Oysters that were heavily polluted and contaminated with ship fuel oil were also reported to contain 3, 4-benzpyrene. The Battelle review also reported barnacles attached to creosoted poles located in marine waters contained the same carcinogenic hydrocarbon (3, 4-benzpyrene), and it elicited sarcomas in mice when extracts from the barnacles were injected into the mice. The endemic occurrence of papillary tumors around the rectal opening of soft shell clams (*Mya arenaria*) was reported, but the author (Battelle Memorial Inst., 1967, pp. 6-19) did not feel these were due to oil pollution, even though the clams were taken from waters adjacent to areas highly polluted by ship fuel oil.

Aggregations of the planktonic forms of many pelagic and benthic organisms occur in the surface layer of the sea. This community of the surface 5 cm., the neuston, is the first affected by oil entering the water. Many planktonic larvae are phototrophic at their earliest stages and concentrate in this layer. Organisms in these early development stages appear most sensitive to oil pollution, coincidentally with their period of greatest exposure.

Studies by Mironov (1968, p. 336) on the development of fertilized eggs of the plaice (*Rhombus macoticus*) showed extreme sensitivity of the eggs to the influence of oil products present in seawater. He noted that injury to the eggs occurred at concentrations of 10^{-4} to 10^{-5} ml/l (0.1 to 0.01 ppm). In these concentrations of oil products, 40 to 100 percent of the hatched pre-larvae showed some signs of degeneration during development and perished. Mironov (1969a) also demonstrated that 1 ppm crude oil was toxic to the eggs of anchovy, scorpion fish, and sea parrots from the Black Sea.

Larvae of *Elinius modestus*, an Australian barnacle introduced to Europe, are tolerant of 100 ppm crude oil but show a delay in setting of the cyprids (the final larval stage), while adults of this species can tolerate higher concentrations but show reduced activity at 100 ppm (Corner, et al, 1968). Mironov (1968, p. 337) reported that experiments with adult and post-larval stages of barnacles (*Balanus* sp.) showed the latter to be a hundred times more sensitive to oil pollution than the adult forms.

Decreased limb (cirral) activity of marine larvae exposed to oil has been reported (Smith, 1968, p. 135). Irreversible damage to cell membranes and granular contents of planktonic larvae may also occur. Goldacre (reference in Arthur, 1968, p. 161) has demonstrated such cytological damage and death to the freshwater protozoan, *Amoeba proteus*, exposed to crude oil fractions.

Mironov (1968b) tested crude oils on several copepods and a cladoceran, finding 1 ppm killed all forms within less than a day. *Acartia* and *Calanus* were reported (Mironov, 1968, p. 336) to succumb to 0.01 ppm oil in seawater in 72 to 96 hours. Although surviving longer than copepods, larvae of crab and shrimp also die at 1 ppm (Mironov, 1969c). Two of the copepods tested, *Acartia clausi* and *Paracalanus parvus*, occur in Alaskan waters.

Mironov and Lanskaya (1968) demonstrated that marine phytoplankton vary several orders of magnitude in sensitivity to crude oils and kerosene. Of the 20 species they tested (in oil concentrations ranging from 0.1 ppm to 1,090 ppm) *Ditylum brightwellii*, a diatom occasionally found in Alaska, was the most sensitive. The wide variation in susceptibility may account for the statements of low toxicity of crude oils to phytoplankton found in other reviews (Foy, 1965; Davis, 1970; Nelson-Smith, 1970).

Cellular membranes of phytoplankton are damaged by the penetration of hydrocarbon molecules, which leads to the extrusion of cellular contents and to the penetration of oil into the cell. The hydrocarbons reduce the transpiration, probably by blocking the stomas and the intercellular spaces. The effects of oils on respiration are variable, but an increase of respiration is frequently observed, and may be due to an alteration of the mitochondria. This results in an uncoupling of the oxidative phosphorylation enzymes from the electron transport enzymes and the energy release is lost as heat. As for the detergents, if they are administered in a rather concentrated solution, their penetration into the plant cells will cause the dissolution of cellular membranes and the extrusion of cellular fluid (FAO, 1970, pt. 2, p. 6; Baker, 1971, p. 6).

Baker (1971, p. 37) reviewing the literature, noted that weathered *Torrey Canyon* oil had no apparent effect on photosynthetic activity of green algae, but that green algae treated with fresh crude oil died. Photosynthesis in kelp (*Macrocystis*) was reduced when exposed to various petroleum products.

Benthic organisms are also affected by oil entering on the surface waters. ZoBell (1962, pp. 99-100) reports oil is readily absorbed by clay and silt, and suggests that although absorption of oil by solids renders the oil more susceptible to autobial and microbial oxidation, almost no bacterial decomposition occurs after burial.

Suspended sediments carried by runoff from a major flood entered the Santa Barbara Channel area immediately prior to and after the well blowout. Adsorption of oil on the flocculated suspended particles followed by decomposition was a major factor in carrying much of the oil to the sea floor (Kelpack, 1970). Kinney et al. (1970, p. 92) reported, however, that the glacial silt of Cook Inlet was observed to have no apparent effect on the emulsion properties or the sinking of that Alaskan crude oil.

In oil-producing areas, oil residues have often been observed on sandy beaches (ZoBell, 1962, p. 100) and in marshes and depths of water to 15.3 m. (Blumer, Sass, et al, 1970, p. 23). A portion of the fuel oil spilled into the harbor at Resolute, Northwest Territories, Canada, late in August 1970 went ashore there. On the basis of a casual sampling on September 3, 1970, the average penetration into the beach material was observed to be about 3 inches (7.6 cm) (Barber, 1971). Such oil may be buried and stay intact for a considerable time, even at the higher temperatures of the California coast (ZoBell, 1962, p. 100). Ramseier (Personal communication to D. R. Evans from R. O. Ramseier, 1971), discussing the behavior of oil in the Arctic, noted that practically no aging occurs to oil under ice, emulsification was negligible, and finally the process of biodegradation is not active at these temperatures of near 0°C and below.

Blumer, Sass, et al (1970, p. 25) reported toxic components of No. 2 fuel oil present in bottom sediments the year following the West Falmouth oil spill and concluded the toxic properties of the oil slowed its biodegradation. This same spill provided a unique opportunity for the study of the immediate and long-term effects of an oil spill on an area where the previously existing environmental base was well known (Blumer, et al, 1971). One effect of the oil in the bottom sediments was to reduce the cohesion of bottom sediments of tidal marshes and the estuary by killing the benthic plants and animals. The resulting erosion spread hydrocarbons to new areas where the process was repeated. Because of the stability of the hydrocarbons in marine organisms and their persistence in bottom sediments, Blumer, et al (1971) concluded that a single oil spill could cause a chronic pollution problem in the vicinity of that spill.

ZoBell (1969, p. 320), discussing oxygen requirements for oil oxidation, noted that when oil oxidizers are in contact with the normal atmosphere, as at the air-water interface, the supply of oxygen is usually adequate. In areas of intense microbial activity below the water surface, particularly in bottom sediments, oxygen may be a limiting factor. This depends upon how rapidly oxygen is consumed and how rapidly it is replenished. Replenishment may be by oxygen diffusion, water turbulence, or photosynthetic activity in shallow water. Calculating average BOD (Biochemical Oxygen Demand) requirements for various crude oil fractions, he estimated it would require all of the dissolved oxygen in about 320,000 gallons of seawater for the complete oxidation of 1 gallon of crude oil. The complete oxidation of oil would require all of the dissolved oxygen in about 40 acre feet of seawater assuming replenishment from the atmosphere or photosynthetic activity.

Blumer (1970, p. 12) summarizes the potential damage to marine ecology from pollution with crude oil and oil fractions as follows:

Direct kill of organisms through coating and asphyxiation.

Direct kill through contact poisoning of organisms.

Direct kill through exposure to the water-soluble toxic components of oil at some distance in space and time from the accident.

Destruction of the generally more sensitive juvenile forms of organisms.

Destruction of the food sources of higher species.

Incorporation of sublethal amounts of oil and oil products into organisms resulting in reduced resistance to infection and other stresses (the principal cause of death in birds surviving the immediate exposure to oil).

Incorporation of carcinogenic and potentially mutagenic chemicals into marine organisms.

Low level effects that may interrupt any of the numerous events necessary for the propagation of marine species and for the survival of those species which stand higher in the marine food web.

A recent technical conference in Rome, Italy, on the subject of marine pollution and its effects on living marine resources and fishing (FAO, 1970) provided the following summary :

"Crude petroleum is a complex mixture of natural products and includes many thousands of different compounds. Although crude oils differ markedly in their physical properties, the basic chemical, biological, and toxicological properties of crude oil are quite similar. Petroleum and its hydrocarbons have been found to be remarkably stable in the marine environment. Although hydrocarbons that are dissolved in the water column are eventually destroyed by bacteria, the most toxic compounds are the ones that are the most refractory."

"The immediate short-term effects of oil pollution are rather obvious. However, some of the most serious aspects of oil pollution deal with the low-level toxic effects, particularly on young forms of marine animals. The great complexity of the marine organisms present a potentially dangerous situation which may adversely affect our fisheries resources. Hydrocarbons may not only be retained, but they may also be concentrated and become protein bound. Thus, petroleum may contribute to the destruction of food values through the incorporation of oil and oil products into fisheries resources."

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MARINE FISHERIES RESOURCES

The plankton resource is vulnerable to both acute and low-level chronic oil pollution. Acute pollution from infrequent large oil spills might do less permanent damage to plankton than could chronic low-level pollution, in spite of the fact that the toxic components would be more concentrated in localized areas.

In the case of large spills, mass kills of planktonic larvae coming in contact with oil at the surface would be expected. The depth to which toxicity would occur would depend upon the physical and chemical processes dispersing the oil, while the concentrations of oil components necessary to be toxic would depend in part upon the species involved, their developmental stage, and metabolic rates as influenced by temperature. Sunken oil from spills could render bottoms uninhabitable for larval setting and probably would adversely affect a large proportion of the adult animals producing planktonic larvae.

Because many planktonic forms are short-lived and drifting organisms, in the case of short-term local pollution such as oil spills, new healthy populations may be carried in from adjacent unaffected areas (Mileikovsky, 1970). Although the new populations may not have the same composition as the old, recovery time is apt to be short for plankton that complete their life cycle drifting in the water mass. It may take several years, however, for the benthic populations which provide the plankton that migrate daily from surface to bottom to be re-established if the substrate is affected by a spill.

Chronic oil pollution on zooplankton may have sublethal effects. Toxic hydrocarbons may be concentrated by zooplankters (Mallet and Sordau, 1964; Millet and Lame, 1965; both cited in Mironov, 1968) and be passed up the food chain in the same manner as are insecticides and heavy metals. Carcinogenic effects from chronic pollution may occur in the plankton as already demonstrated in benthic bryozoans (Powell et al., 1970). Plankton populations and their importance to the biological community may also be adversely affected by the lowered production of planktonic larvae by the benthic adults. Adequate studies on oil pollution and its effect on the reproductive capability of fish and invertebrates appear not to have been done.

Shellfish, in addition to their significant contributions to the planktonic life of marine ecosystems, are of special recreational and commercial interest in their adult form. That oil pollution is damaging to shellfisheries is becoming well documented. Blumer, et al., (1970 p. 25), reports that the closure to taking of shellfish—oysters, scallops, soft-shell clams and quahaugs—was maintained into the second year following the West Falmouth spill. They note that the presence or absence of an "oily smell" is no clue for presence of oil pollution in shellfish or fish.

Testimony by Dr. Clarence M. Tarzwell (U.S. Senate, 1971, p. 210) reported a significant difference in sensitivity to oil between several species of molluscs tested, with scallops being the most sensitive. Mortalities resulted from mechanically dispersed oil as well as from crude oil floating on the surface of the water. Oysters developed lesions in the vascular system at sublethal concentrations.

The salmon resource is vulnerable to impact from oil pollution during most life stages. Prior to hatching, the intact chorion, or outer covering, of salmon eggs may present a barrier offering some protection against pollutant hydrocarbons. After hatching, however, the alevins become much more vulnerable to invasion by dissolved substances passing through the relatively unprotected wall of the attached yolk sac. Fat-soluble hydrocarbons, such as the highly toxic aromatics, could enter from the surrounding water to become concentrated in the yolk and embryo at this time. That alevins, or sac fry, are more sensitive to some toxicants than eggs has been shown by Rice (1971) in experiments with the effect of ammonia on rainbow trout.

The food web of juvenile salmon during early life in estuarine and nearshore waters is critically dependent upon the environment and planktonic life of these regions (Parsons and LeBrasseur, 1970). J. E. Bailey (Personal communication by J. E. Bailey to D. Evans, 1971), studied and showed the dependency of pink and chum salmon fry on food organisms of the nearshore and littoral or intertidal regions of Southeast Alaska. A strong proportion of planktonic forms of nearshore and littoral dependent organisms made up substantial amounts of the food of these juvenile salmon.

A significant cyclical estuarine photosynthetic production, characterized by large increases in phytoplankton during the spring, occurs at the time of large concentrations of fish in the estuaries (Copeland, 1971, p. 828). Biological timing of an organism's life cycle with favorable conditions in the environment is recognized in many animals (Andrewartha and Birch, 1954, p. 85, 525).

Gunter (1961, p. 182) has pointed out the estuaries are nursery grounds and refuges for young fishes. Even a temporary loss of phytoplankton and intertidal and littoral invertebrate production due to an oil spill could have devastating effects on other species if it occurred at certain times and places.

Pacific herring spawn during the spring and their eggs attach to material in the intertidal zone where they would be exposed to both floating oil and oil dispersions obtained by mechanical or chemical means. Kuhnhold (1970, p. 8-10) working with the Atlantic herring and other fishes and several types of crude oil found that toxic components are dissolved from oil films injuring larve and younger stages of floating eggs. He noted that even if the concentration of dissolved compounds are sublethal to eggs, the embryos might be injured and the hatched larve were even less resistant. The study emphasized the variability in results between tests, using the various crude oils and the difference in toxicity to various stages of the life cycle of herring, as well as between similar life stages of different species of fish. For example, herring larve were less resistant and plaice larve were more resistant than cod larve of the same age.

Kuhnhold (1970, p. 10) also observed that herring larve were unable to avoid oil contaminated water, especially mixtures of oil and chemical dispersant. He concluded that the chemo-receptors seem to be blocked very quickly at the first contact with oil components, and thereafter the larvae entered and crossed well defined milky clouds of even highly concentrated oil dispersions with resultant high mortality. Other studies (FAO, 1970; Tarzwell, 1970, pp. 266-267; U.S. Senate, 1971, pp. 207-208) also reveal that oil dispersant and crude oil mixtures are much more toxic than the oil alone and even more toxic than the oil dispersants alone.

Recent experiments with Prudhoe Bay crude oil and Pacific herring (Personal communication by S. D. Rice to D. R. Evans, 1971) demonstrated that minute amounts of the water soluble fractions were toxic to newly hatched larvae. Eggs incubated in dilutions of the water-oil mixture which had been filtered to remove all but the microscopic suspended immiscible water-oil droplets resulted in a higher percentage of unsuccessful hatches than among the controls.

Several studies (James, 1926; Kuhnhold, 1969, 1970; Chipman and Galtsoff, 1949; Mironov, 1967, 1968, 1969a, b, c) have demonstrated that various oils including crude oil are toxic to several species of marine fish eggs and larvae. The toxic concentrations ranged from 1 ppm to 2×10^4 ppm. There have not been sufficient studies, however, to describe the long-term effects of sublethal levels of oil pollution.

One possibly serious effect of oil dispersed over wide ocean areas could arise from the fact that chlorinated hydrocarbons such as DDT and dieldrin are highly soluble in oil films. Measurements of the effects of a natural slick in Biscayne Bay, Florida, showed that the concentration of a single chlorinated hydrocarbon (dieldrin) in the top one millimeter of water containing the slick was more than 10 thousand times higher than in the underlying water (M.I.T., 1970, p. 142). Parker (1971, p. 51) commenting on the worldwide distribution of pesticides noted that the poor solubility of many of these substances in water suggests that they may concentrate in surface slicks on the ocean, where they may spread rapidly over great distances. He concluded that such a mechanism of transport would increase in efficiency in the presence of oil slicks, which have been increasing steadily world-wide since the advent of tankers.

Winds and ocean currents bring about a convergence and retention of surface concentrations of hydrocarbons in the subarctic and equatorial convergence zones, such as the Sargasso Sea. Blumer (1969, p. 6) reported that nets sampling the sea surface layer were fouled with oil and collected a larger volume of tar-like material than of Sargassum weed.

Campbell and Martin (Personal communication to D. R. Evans from W. J. Campbell and S. Martin, 1971) report the presence of an anti-cyclonic gyre as a feature of the oceanic and ice circulation of the Beaufort Sea. They suggest a strong case can be made for the high probability that once an oil spill enters the ice pack it will become part of the system, circulate around the gyre and diffuse into and around the gyre.

A somewhat similar convergence situation may have been responsible for a 1970 oil pollution in Gulf of Alaska waters. The report (U.S. Department of the Interior, 1970) concerning this Kodiak oil pollution incident noted that the oil could have been legally discharged on the high seas beyond the 50-mile limit specified by the International Convention for Prevention of Pollution of the Sea by Oil. Amendments to the Convention now being ratified will limit the rate of discharge to a total of 1/15,000 of a ship's loading capacity per ballast voyage. As in the past, compliance with such regulations will be voluntary; the Swedish Coast Guard, for example, has declared itself incapable of ascertaining that no more than 60 liters per mile have been released during passage of a ship (Boos, 1970).

In accordance with Alaska state law (AS 46.03.750) the terminal operator would require that no ship be loaded at Port Valdez unless the master of the vessel certifies that oil material has not been discharged at any point during the incoming voyage. The context of this regulation, however, permits discharges outside of State waters that are not in excess of 50 ppm of oil residue.

Thus, although the position of the United States as presented at the Brussels Conference on Oil Pollution of the Sea in November of 1970 is to "achieve by mid-decade a complete halt to all intentional discharge of oil and oily wastes into the oceans by tankers and other vessels" (NATO, 1970, p. 42), current regulations and practice allow substantial discharges.

Very little research has been directed toward identifying the less obvious effects of oil pollution due to intentional discharge at sea. At the present time the most conspicuous oil pollution incidents are localized and are caused by accidental spills in nearshore areas; a recent study reported 85 percent of the major oil spills reviewed occurred within 50 miles of a port (Dillingham Corporation, 1970, p. 13).

A study of critical environmental problems sponsored by the Massachusetts Institute of Technology (MIT, 1970) reported that, depending upon their location, character, and concentration, petroleum hydrocarbon pollutants in the ocean can produce the following unwanted consequences:

1. Poisoning of marine filter feeders such as clams, oysters, scallops and mussels; other invertebrates; fish and marine birds.

2. Disruption of the ecosystem so as to induce long-term devastation of marine life from mass destruction of juvenile forms and of the food sources of higher species.

3. Degradation of the environment for human use by reducing economic, recreational, and esthetic values on both short- and long-term basis.

The same study also pointed out that crude oil and oil fractions poison marine organisms through different effects:

1. Direct kill through coating and asphyxiation or contact poisoning.

2. Direct kill through exposure to the dissolved or colloidal toxic components of oil at some distance in space and time from the source.

3. Incorporation of sublethal amounts of oil and oil products into organisms resulting in reduced resistance to infection and other stresses (one of the principal causes of death of birds surviving the immediate exposure to oil).

EFFECT OF OIL POLLUTION AT SEA ON BIRDS

Erickson (1963) noted that oil pollution may serve as an agent of intermittent but continuing attrition, especially on those migrant birds using coastal and off-shore waters. Most pollution-caused losses occur during the coldest months when the birds are abundant along the coast and are concentrated at stopover points or on the wintering grounds. Losses under these circumstances may be especially important because they may affect birds which have already survived the southward flight and hunting season, and have become the remaining potential breeding stock for the next nesting season.

Damage caused to seabirds by oil pollution is often obscure because it is difficult to detect when birds are lost from more distant populations and because the effect may be widely spread and difficult to distinguish from other causes of mortality (Bourne, 1970). The affinities between wintering and breeding areas and migration routes for most populations of seabirds are mostly either unknown or based on speculation. Better information is available for some populations of waterfowl because of extensive bandings and relatively high recovery rates of bands for some species.

The following discussion of the documented effects of oil pollution on birds includes estimates of mortality which are considered to be low. This is because the estimates are based primarily on beach counts of oiled birds and such counts are low for several reasons. Scavenging foxes and gulls quickly remove some carcasses and others are either tossed high upon the shore or buried in sand. Circumstantial evidence suggests that from 50 percent to 91 percent of the birds killed at sea may never wash ashore (Jones, et al., 1970; Tanis and Märzer Bruyns, 1968); but, rather, they sink or are eaten by gulls and fish. Additionally, birds may either die some distance from the site of oiling or, as later discussed, they may be reproductively impaired.

During February and March 1970, at least 10,000 birds were killed by oil apparently derived from ballast pumped from tankers entering Cook Inlet, Alaska, in what was referred to as the "Kodiak Oil Spill" (U.S. Department of

the Interior, 1970).¹ No surveys were made to assess the mortality and only 29 oil-killed birds were identified to species. Alcids, seaducks, gulls and kittiwakes were known to be killed; other species were suspected to have been involved by virtue of their presence within the polluted area. James G. King (Personal communication to Regional Director, BSWF, Portland, Oregon, from J. G. King, 1970) believed that the kill was perhaps 10 times the announced 10,000 birds, because of his observations on the duration of the pollution and on the fact that oil was also found at the lower end of the Kenai Peninsula and on Montague Island immediately following the reported kills at Kodiak. This essentially doubled the 1,000 miles of shoreline originally believed to have been contaminated and thereby presumably doubled the estimate of birds killed. The exact source and volume of oil involved are not known.

On October 5, 1968, the day following reports of waterfowl in trouble near Homer, Alaska, aerial surveys along both shores of Cook Inlet between Anchorage and Homer found many dead or dying guillemots and murres and between 250 and 350 ducks that were covered with oil (Anonymous, 1968). Sources and volume of oil involved are not known.

On seven days between November 22 and December 8, 1967, the Environmental Protection Administration (no date) logged that oil pollution, presumably from oil ballast, killed ducks within Cook Inlet, Alaska. An estimated 1,800 to 2,000 seaducks and other waterbirds were killed (Evans, 1969). Volume and exact source of oil are not known.

The West Coast of the United States has had a number of recorded bird kills from oil spills. On January 18, 1971, two tankers collided in San Francisco Bay and lost 840,000 gallons of bunker oil, which killed many thousands of birds (Lassen, 1971). Included in the 4,557 birds identified at receiving stations were: western grebe 55.7 percent, other grebes 2.5 percent, scoters 22.5 percent, other ducks 2.8 percent, common murres 9.8 percent, loons, 4.1 percent, and less than 1 percent each for cormorants, gulls, American coots and miscellaneous species (Wallace, 1971).

On September 6, 1956, the freighter "Seagate" lost an unknown amount of bunker fuel after running aground near Point Grenville off the Washington coast. A week later, searches for oil-killed birds along four stretches of beach, all but one a mile or more in length, found an average of 132 white-winged scoters and 56 common murres per mile of beach, with lesser numbers of red-necked grebes, common loons, pelagic cormorants and one each pigeon, guillemot, marbled murrelet, and surf scoter (Richardson, 1956). Although the kill was believed to have been more severe to the north rather than to the south of the accident site (Richardson, 1956), LaFave (1957), two weeks after the spill, reported finding 36 white-winged scoters, 21 surf scoters, and 70 murres, dead and presumably killed by oil, along a measured mile of beach in Grays Harbor, nearly 25 miles to the south.

In 1937 an unknown volume of oil from a tanker in San Francisco Bay contaminated 55 miles of shoreline and killed more than 10,000 birds, over 60 percent of which were murres with many western grebes and white-winged scoters also perishing (Aldrich, 1938; Moffitt and Orr, 1938).

The eastern coast of North America also has numerous examples of oil spills and resulting bird losses. From February to April 1970 there were an estimated six oil slicks from four sources drifting off the coasts of southern Newfoundland and eastern Nova Scotia. The majority of this oil came from the wrecked tanker "Arrow" and the leaking oil barge "Irving Whale" and killed at least 12,800 birds, mostly alcids and eider ducks, before drifting out to sea (Brown, 1970).

According to Tuck (1960) oil pollution is the greatest cause of mortality to thick-billed murres and common murres wintering off Newfoundland where many great circle routes of ocean-going vessels converge. Winds and currents bring dumped and lost oil shorewards causing heavy losses of murres, eider ducks and other seabirds. Although losses occur throughout the year, they are greatest in winter when eider ducks concentrate inshore and murres offshore.

Dennis (1959), as part of an oil pollution survey, records a loss of 7,500 birds, 80 percent of which were eiders, on the shore of Nantucket in 1956.

Burnett and Snyder (1954) observed a decline in the wintering population of common eiders off the Massachusetts coast from 500,000 in 1952 to 150,000 in 1953

¹ The mortality should not be confused with one on Bristol Bay during April, 1970, which involved at least 86,000 murres. Though not clearly understood, that mortality was perhaps attributable to the combined effects of a severe storm upon birds weakened by the winter period (J. C. Bartonek, personal observation, 1970).

and attributed it in part to losses resulting from oil spilled by two wrecked tankers in February 1952.

The history of marine oil transport throughout the world includes many oil spills (Bourne, 1969). A few of the major ones in recent years are mentioned here as additional background. Statistics from the Liverpool Underwriters Association list 19 tanker groundings (with 17 spillages) and 238 tanker collisions (with 22 spillages) from June 1964 to April 1967 (Aldrich, 1970).

According to the Smithsonian Institution Center for Short-Lived Phenomena, 15,000 to 25,000 oil-affected eiders came ashore on the Wadden Islands, Netherlands, in February 1969 (Aldrich, 1970).

Oil spilled from the wrecked tanker "Torrey Canyon" in March 1967 off the coast of England killed many tens of thousands of birds. Nearly 8,000 birds were picked up still alive on the English coast alone for attempted rehabilitation (Bourne, 1970).

When the "Gerd Maersk" was stranded off the mouth of the Elbe River in January 1955 at least 500,000 birds of 19 species were killed, the most abundant being common scoters (Goethe, 1968).

Bird losses due to oil pollution have suppressed some local populations for prolonged periods. Uspenskii (1964) reported that more than 30,000 wintering oldsquaws perished from oil pollution near Gotland Island in the Baltic and that in subsequent years, oldsquaws had almost completely disappeared from Swedish Lapland.

EFFECT OF OIL ON BIRDS AND THEIR HABITAT

Birds are killed by oil on water. Some survive the contamination, but are discomforted and probably reduced in reproductive capability. The extent of oiling, type of oil, and the prevailing weather conditions usually determine the fate of these birds.

The immediate effect of oil is on the birds' plumage. According to Clark (1969), feathers become matted together, destroying the water-repellant property of the plumage and allowing water to replace the air normally trapped in it. When the plumage becomes oil-soaked and water-logged, birds lost buoyancy and the ability to fly (Erickson, 1963), and diving ducks are unable to dive for food (Chubb, 1954). Taning (*in* Tuck 1960) reported seeing oil-affected alcids far out at sea, so soaked with water that they could keep only their head and neck above the surface. Some birds drown and are never swept ashore.

Experimentally oiled ducks greatly increase their metabolic rates to compensate for heat lost because of a breakdown of the insulating properties of the plumage, with heavily oiled ducks losing more than twice the heat of normal ducks (Hartung, 1967). Because oiled ducks either do not or can not increase their feeding activity to compensate for the increased energy demands and because their fat reserves, if any, are quickly depleted, they suffer from accelerated starvation. Accelerated starvation during periods of low temperatures is usually fatal for most waterbirds. Tuck (1960) claimed that a patch of oil, one inch in diameter, on the belly of a murre was sufficient to destroy the insulating air pocket and cause death from exposure to the chilling effect of the sea.

Sticky globs of oil were found on the beaches of Kodiak Island following the oiling of birds there in February and March of 1970, and James G. King (Personal communication to Regional Director, BSWF, Portland, Oregon, from J. G. King, 1970) speculated that this oil could kill birds by adhering to their bills, mouths, and nares and thus fatally impair breathing and feeding.

Although the relative toxicity of North Slope crude oil to birds is not known, many refined petroleum materials are known to be lethally toxic to waterbirds. Hartung and Hunt (1966) demonstrated that various industrial oils caused lipid pneumonia, gastro-intestinal irritation, fatty livers, and adrenal cortical hyperplasia when fed to ducks in single doses that were regarded to be less than that which might be ingested during preening of oiled plumages. Although the toxicity varied among the oils tested, all oils were more toxic when the captive ducks were under stress from crowding and low temperatures. Beer (1968) observed comparable necrotic conditions among alcids retrieved from the "Torrey Canyon" spill. Some components of crude oils are carcinogenic (Blumer, 1969).

Stress is unlikely to be directly responsible for the deaths of birds, but it is an important contributing factor (Clark, 1969). All of the combined effects of cold, starvation, toxic effects of oil, disturbance, internal injury and, presumably, fright combine to cause acute stress. The bird's resistance to secondary infections and the toxic effects of oil are reduced, often beyond the threshold

of recovery. Birds under stress are also probably more vulnerable to predation than healthy birds.

Some waterbirds that become contaminated with nonlethal doses of petroleum during the breeding season are not likely to contribute to the annual production. Hartung (1965) found that ducks which had been fed small doses of a relatively non-toxic, lubricant oil stopped laying for about two weeks, while "control" ducks continued to lay normally. Many shorebirds which rely upon the intertidal zones for feeding may find them completely blanketed with oil."

Other ramifications of oil in the avian marine habitat are discussed in the preceding section on "Marine Fishery Resources".

NATURE OF CONTAMINATION

Groups believed to be the most susceptible to contamination by oil along the marine route between Valdez and southern ports are: murre, guillemots, auklets, murrelets, puffins, cormorants, loons, grebes, eiders, scoters and oldsquaws. Shearwaters, fulmars, albatros, petrels, gulls, terns, shorebirds and some ducks and geese are also vulnerable to contamination at sea but less so than divers.

Some bird species are more vulnerable to oil than others as indicated by records of casualties (Clark and Kennedy, 1968; Bourne, 1968b; Wallace, 1971) which show good relationships between the amount of time that a species spends in the water and the frequency of contamination (Erickson, 1963). In Great Britain (Bourne and Devlin, 1969) oil has had its main impact on a limited number of diving birds which are already known to be decreasing, including, especially the auks and common scoter. Although a considerable number of gulls are affected, their mortality rate appears to be much lower, presumably because they seldom become as soaked with oil as alcids and because they do not stay on the water to get chilled afterwards.

Bourne and Devlin (1969) believe that the main mortality from oil pollution arises because birds on the water are trapped unawares by long slicks drifting toward them. Presumably once the birds are caught in the oil they drift with it until they starve to death and their bodies either sink or wash ashore days later.

According to Bourne (1968a), suggestions that birds positively seek out oil because it makes the water calm, or resembles food, or tide-rips, or shoaling fish associated with the presence of food, seem to be based chiefly on speculation. He observed swimming birds not taking notice of a drifting, narrow slick of oil until they came in contact with it. Upon contact, gulls flew away and murrelets dived beneath the slick. The diving behavior of alcids to escape danger would probably be fatal if they rose from the dive into the slick, such as was believed to have been the case for most alcids killed during the "Torrey Canyon" disaster.

Birds that concentrate and feed along current convergence lines may be susceptible to contamination by oil. Evans (1969) found that some spilled oil in Cook Inlet collected within and attached to the windrowed vegetation and debris that occurs along convergence lines; he believed that that oil would float about on tidal currents for an extended period.

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MARINE MAMMALS

The sea Otter (*Enhydra lutris*) is unique among marine mammals and is similar to birds in that it has no insulating blubber layer. It is also similar to birds in that the otter is protected from environmental temperatures by an air blanket trapped among the dense fur fibers of its pelt. If the water in which the sea otter lives is polluted by any foreign substance that causes the fur to mat or otherwise lose its water-repellent character so that water reaches the skin, body temperature is lost and the otter soon dies of exposure.

Accidental exposure of two sea otters to a small but unknown amount of oil (probably diesel) in an experimental holding pool on Amchitka Island resulted in fur matting, progressively severe distress, emergence from the water, and death by exposure within several hours (K. W. Kenyon, unpublished data). The oil in this case formed a visible sheen, comparable to that sometimes present in harbor areas where gulls appear unaffected by it. Similar or greater petroleum pollution in the marine environment would prove fatal to any sea otter that came in contact with it.

The northern fur seal (*Callorhinus ursinus*) is insulated from the chilly marine environment by both blubber and fur. Fur seals differ from all other marine mammals except the sea otter because water does not penetrate the dense underfur of its pelt during life. The insulation furnished by the fur is inferred to be necessary to proper thermoregulation in the fur seal and any substance destroying this insulating barrier could result in death by exposure.

Accidental exposure of a less than year-old fur seal on the Oregon coast in 1959 led to the animal being brought to the Depoe Bay Aquarium. It was very thin and weak, and virtually covered with oil. Solvents were used under the direction of a veterinarian to remove the oil and the cleaned seal was washed with soap and water. At first it would not eat, so it was force-fed. The animal recovered completely and was, in 1971, still an exhibit at the aquarium (Personal communication to K. W. Kenyon from W. Kukaska, 1971). The presence of petroleum did not damage the seal permanently. It may also be inferred that the presence of a large amount of petroleum on the animal interfered in some way with the animal's ability to obtain food and that it would have died from a combination of starvation and exposure if it had not been rescued.

Of the 3,769 seals taken during pelagic sealing studies of the Marine Mammal Biological Laboratory, Seattle, during the 1964 to 1971 seasons, one was observed to have "half of the belly matted with grease" (Fiscus and Kajimura, 1967). Among 107 fur seals taken at sea in May 1969, off Washington and British Columbia, 12 (11 percent) were contaminated with oil. Of those, 8 were taken almost directly off the mouth of the Strait of Juan de Fuca. This indicates that fur seals that enter busy shipping lanes may become contaminated by oil (Personal communication to K. W. Kenyon from I. MacAskie, 1971). Among hundreds of thousands of fur seals harvested and observed on the Pribilof Islands breeding grounds, not one seal having oil on its pelage has been recorded. One dead fur seal, less than 1 year old, found on a Washington beach, was brought to the Marine Mammal Biological Laboratory in about 1948. An area amounting to about $\frac{1}{5}$ of its body surface was heavily matted with crude oil. The apparent cause of death was starvation.

Three conclusions are indicated: (1) In most open sea areas where fur seals are found on migration, they infrequently come in contact with petroleum products, although, when they enter busy shipping lanes, oil contamination may occur; (2) The absence of seals contaminated by oil on the breeding grounds suggests that either contaminated animals do not survive to return to the grounds or that none become contaminated during migration, or that they become clean enroute; (3) Information on seal mortality due to any cause is severely limited because fur seals usually occur well offshore, the body is of greater specific gravity than water, and the dead animals sink and thus would rarely be found on beaches.

Two dead harbor seals (*Phoca vitulina*) that were heavily coated all over with crude oil have been reported. One was found in Tacoma Harbor and the other in Tacoma Narrows, Puget Sound, in about 1952. It was presumed that both had died because of the oil on their bodies but no positive determination was made. The source of the oil was ascribed to intentional ship discharges, but no definite linkage was established.

A yearling harbor seal was found completely covered with crude oil about 1952. When it was brought to the Tacoma Aquarium from a beach in Tacoma Harbor, it was thin and weak. The seal was carefully cleaned, and with care and

feeding in the aquarium the seal returned to normal health (Personal communication by C. Brosseau to K. W. Kenyon, 1971).

No harbor seals were observed with oil on their bodies during a 1965 to 1971 study of a colony on Gertrude Island in Puget Sound (Personal communication to K. W. Kenyon from T. C. Newby, 1971).

The conclusions indicated from these harbor seal observations are like those for fur seals: (1) oil covering the body may interfere with normal habits and lead to starvation; (2) petroleum materials do not permanently damage the seal if carefully removed; (3) in an observed colony no seals with oil were found either because of no contact with oil or failure to survive such contact.

LeBoeuf (1971) described the results of a study of the northern Elephant seals (*Mirounga angustirostris*) on San Miguel Island, California, made in March 1969, shortly after the Santa Barbara oil spill. On 25 March 1969, his group tagged 58 weaned pups and 5 yearlings that had at least 75 percent of their bodies covered with a mixture of oil, mud, and sand. As a control, they also tagged on the same day an equal number of clean pups on an adjacent beach that was free of oil. In a period of 1 to 15 months after the animals were marked, a total of 25 (40 percent) of the animals that were oiled were sighted in apparent good health and 15 (25 percent) of the control group were reported. LeBoeuf (1971, p. 280) concluded that: "These data support the conclusion that the crude oil which coated many weaned elephant seals at San Miguel in March and April 1969, had no significant immediate nor long-term (1-15 months later) deleterious effects on their health. Had the rookery been contaminated earlier in the season when females were nursing, pups might have ingested the crude oil and more serious consequences might have ensued." Studies of tissues from dead marine mammals found on San Miguel Island after the oil spill failed to show any evidence that they might have died because of oil (Simpson and Gilmartin, 1970).

Orr (1969) conducted field observations and reviewed accumulated data subsequent to the spill. He stated (p.7): "A review of recorded dead gray whales found during migration along the California coast during the past 10 years revealed that the incidence of mortality in early 1969 was not unusually high." No mortality among seals, sea lions, or cetaceans was found that appeared abnormal or could be attributed to the oil spill. Orr concluded " * * * that no positive evidence was obtained to show that any gray whales died on their northward migration from the effects of crude oil pollution."

Orr participated in field studies of wildlife affected by the extensive Golden Gate spill of Bunker "C" oil that occurred on 18 January 1971. Although he reported massive destruction of bird life, he reported no effect on marine mammals (Orr, 1971).

Of the examined California sea lions and other seals that were found dead or dying on southern California beaches, none have had petroleum products on their bodies (Personal communications to K. W. Kenyon from L. A. Grinar, 1971).

Various observers (Personal communications to K. W. Kenyon) have remarked on the general absence of oil on the bodies of marine mammals found on beaches. The large numbers of dead or dying marine birds observed on the same beaches of California, Oregon, and Washington have been interpreted to indicate that oil has been present in the marine environment at various times over a period of years. Thus, marine mammals would appear to be able to avoid petroleum pollution and are less susceptible to damage from petroleum products than are birds.

Sergeant concluded (1970):

"Sea mammals have a notable ability to avoid oil slicks. However, young harp seals heavily oiled by Bunker "C" oil in the Gulf of St. Lawrence in March 1969, swam 200 miles northward on the normal migration route and there was no evidence of severe deaths. Gray seals avoided Bunker "C" at Chedabucto Bay, Nova Scotia, in February 1970, and deaths attributed to oil were few (B. Beck, Personal communication).

"Nevertheless circumstantial evidence accumulates of the cumulative effects of pollutants. Small Cetacea are now rare in the southern North Sea (W. Van Utrecht, Personal communication), where heavy ship traffic, oil and gas exploration and industrial contamination might all be contributory factors to either avoidance or death."

MARINE VEGETATION

The higher the concentrations of low-boiling compounds, unsaturated compounds, aromatics and acids in oil, the more toxic it is to plants (Baker, 1970).

Oil deleteriously affects plants by damaging cell membranes reducing transpiration, often increasing respiration, inhibiting translocation and possibly reducing photosynthesis.

Studies of salt marsh vegetation in Milford Haven have revealed that it may be damaged by exposure to crude oil, although treatment measures may induce more damage (Anonymous, 1970). British investigators have attributed the disappearance of eel grass (*Zostera* sp.) to minute quantities of oil (FWQA, 1969, p. 46). The FWQA report states that oil weakens the plant and makes it susceptible to attacks of a parasitic protozoan *Labyrinthula*. Cowell (1971, p. 429-436) reviews some of the effects of oil spillage on marsh vegetation in Milford Haven.

On the Brittany coast, *Puccinellia maritima*, one of the chief types of European salt marsh grass, and several other varieties of salt marsh grass were killed by MV *Torrey Canyon* oil that had been weathered at sea for at least 7 days (McCaull, 1969). The oil that came ashore on the Brittany coast was considered to be free of detergent and to have weathered for 24 days (Smith, 1968, p. 67). Holme (1969) attributed much of the destruction of the vegetation and invertebrate life from this spill to smothering.

The fuel oil spill of the barge *Florida* in Massachusetts (Blumer and others, 1970, p. 23) killed bottom plants and animals, thereby reducing the stability of the marshland and increasing erosion. Even chronic level pollution can kill vegetation, resulting in erosion of marshes (Cowell, 1971).

Foster and others noted that the main effect of oil seeps of the Santa Barbara coast will be to reduce the availability of intertidal surfaces for the attachment and growth of marine organisms. Effects may be long term, influencing the growth and reproduction of various marine organisms, especially the surf grass and its associated flora and fauna in the intertidal zone. Examples of the loss of marine resources along the Palos Verdes and Point Loma Peninsulas over a 40-year period were noted.

The impact of introduced material on marine vegetation depends on the type of material and the time that the material is in contact with the vegetation. In an oceanic environment, dispersion and dilution set relatively short limits to contact time, processes controlled by the natural behavior of the water itself. In the coastal environment there is a wide variation in the circulation regimes of in-shore waters and continuing contact with vegetation is more likely. Added considerations related to oil spills and marine vegetation are the clean-up procedures and agents used. Clean-up procedures that increase dispersion and dilution by solubilization may affect both the sea floor beyond the intertidal zone and the suspended plant plankton.

ENVIRONMENTAL IMPACT STATEMENT—RATIFICATION OF PROPOSED CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER

SUMMARY SHEET

1. *Name of Action.*—Ratification of proposed Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

2. *Description.*—The action under consideration is the ratification by the United States of a convention developed at an Intergovernmental Conference held at London, October 30 to November 13, 1972 that would prohibit all deliberate disposal at sea from vessels and aircraft of certain dangerous substances, and require permits for the dumping of other substances in accordance with detailed criteria. All coastal states bordering upon the high seas are particularly affected by the action under consideration.

3. *Summary of Environmental Impact.*—The proposed convention would improve the quality of the marine and coastal environments by eliminating, under normal circumstances, the dumping at sea by the parties of certain particularly hazardous materials and controlling the dumping of other potentially harmful substances. As such the convention hopefully would stimulate other nations to abide by procedures and standards for ocean dumping that are in general harmony with those contemplated in the U.S. Marine Protection, Research and Sanctuaries Act of 1972.

4. *Alternatives Considered.*—(A) reliance solely on domestic laws; (B) expansion of the subject convention to cover other forms of marine pollution and activities; and (C) U.S. participation in a possible regional rather than a global ocean dumping convention.

5. *Agencies From Which Comments Have Been Received.*—Environmental Protection Agency, Departments of Agriculture, Commerce, Interior, Defense and Transportation.

Appropriate agencies in the States of Alabama, Delaware, Florida, Georgia, Hawaii, New Hampshire, Massachusetts, North Carolina, Rhode Island, Texas and Virginia.

6. *Dates on Which Statement is Made Available.*—This final impact statement is being made available on this date to the Council on Environmental Quality in accordance with the Council's Guidelines Concerning statements on proposed federal actions affecting the environment. The document is also being made available to the public through the auspices of the National Technical Information Service, U.S. Department of Commerce, Springfield, Va. 22151.

ENVIRONMENTAL IMPACT STATEMENT

I. Summary

This environmental impact statement, prepared in compliance with the requirements of the National Environmental Policy Act, deals with the environmental impact of the proposed ratification of the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter. The text of this Convention was developed at an Intergovernmental Conference held at London from October 30 to November 13, 1972 which was attended by 80 nations. The Convention was opened for signature on December 29, 1972 and signed by 27 nations, including the United States, on that date. A copy of the Convention, together with the Final Act adopted by the London Conference is included in Attachment I.

In summary, the Convention requires the parties to establish national systems to control substances leaving their shores for the purpose of being dumped at sea. Annex I of the Convention contains a "black list" of substances whose dumping would be prohibited under normal circumstances: mercury and cadmium and their compounds, organohalogen compounds such as DDT and PCBs, persistent plastics, oil, high level radioactive wastes and chemical and biological warfare agents. Annex II lists substances requiring special permits as well as special care in each dumping including: heavy metals, lead, copper, zinc, also cyanides and fluorides, waste containers which could present a serious obstacle to fishing or navigation, and medium and low level radioactive wastes. Substances not listed in Annex I or II require a general permit and all dumping must be carried out with full consideration given to a list of technical considerations contained in Annex III.

The Convention provides that each party will take appropriate steps to ensure that the terms of the Convention apply to its flagships and aircraft and to any vessel or aircraft loading at its ports for the purpose of dumping. Full continuous use is to be made of the best available technical knowledge in implementation, which together with periodic meetings and planned participation by appropriate international technical bodies, is designed to keep the contents of the three annexes up-to-date and realistic in meeting the ocean pollution control needs stemming from ocean dumping. No later than three months after the convention comes into effect the contracting parties are to designate a competent organization to perform various secretarial duties.

A Draft Environmental Impact Statement dealing with this subject was circulated for comment to the interested federal and state agencies on September 19, 1972 and a notice as the public availability of the draft was printed in the Federal Register on October 11, 1972. Circulation of the draft impact statement predated the London Conference of October 30 to November 13, 1972. As such, the draft statement focused its attention on the principal issues to be taken up by the Conference as specifically manifested by the draft provisions for a convention which had been produced earlier by the Intergovernmental Meeting on Ocean Dumping at Reykjavik, Iceland, from April 10-15, 1972, and the Intergovernmental Meeting on Ocean Dumping at London on May 30, and 31, 1972. This final impact statement differs from the earlier draft in that it addresses itself to the product of the recent London Conference rather than the earlier Reykjavik and London draft provisions of April and May 1972.

Copies of the written comments received on the earlier draft impact statement are included in Attachment II to this statement. A public hearing on

the draft impact statement also was held in Arlington, Virginia, on October 26, 1972. While no formal comments were offered by any witnesses, officers of the Department of State employed that occasion to answer some informal questions that the attendees at the hearings, including a number of environmental groups, had concerning the then proposed convention.

It should be noted that many of the comments which were received on the draft impact statement, urged that particular positions or provisions should be reflected in the then prospective convention and did not confine themselves to an evaluation of the environmental impacts of new international restraints on ocean dumping. This was a reflection of the fact that the draft impact statement was circulated publicly prior to the London Conference that produced the Convention now open to ratification.

II. Background

The Ocean Dumping Convention which is the subject of this impact statement, represents the culmination of many months of effort on the part of the United States and other nations to restrict and regulate dumping in the interest of preserving the marine environment.

On April 15, 1970, President Nixon announced in a message to Congress, that he had directed the Council on Environmental Quality to conduct a comprehensive study on the effects of the disposal of wastes into the oceans, and the adequacy of existing legal controls over such disposal. In October 1970 the Council responded with a report which concluded that ocean dumping presented a very serious and growing threat to the marine and coastal environments, and which advocated a variety of measures to control dumping. In particular, the CEQ report recommended that the United States take the initiative to achieve international agreement to study, monitor and control ocean dumping.

In his environmental message to Congress of February 8, 1971, the President recommended domestic legislation that would regulate U.S. ocean dumping and instructed the Secretary of State, in coordination with the Council on Environmental Quality, to develop and pursue international initiatives directed toward this objective.

Preparations for the 1972 United Nations Conference on the Human Environment included the creation of several Intergovernmental Working Groups (IWG), one of which dealt with marine pollution. The IWG on Marine Pollution held its first meeting at London during June 1971. At that session, the United States tabled a draft convention on the regulation of the transportation of wastes for ocean dumping. A revised draft of the convention was considered at the second session of the IWG on Marine Pollution held at Ottawa, November 8-12, 1971. The draft articles produced were to serve as the core of a convention. As no further IWG meetings were scheduled, the Government of Iceland invited interested States to a meeting at Reykjavik in April 1972 to develop further the draft convention on ocean dumping. Agreement on a final text was not possible at this meeting, and it was agreed to forward the draft articles to the 1972 United Nations Conference on the Human Environment for further consideration and appropriate action. In an effort to resolve the few remaining disagreements on the text of the convention prior to the Stockholm meeting, the United Kingdom hosted a technical meeting in late May 1972 which reported to the Stockholm Conference certain agreed alternative sections of the convention.

The Stockholm Conference recommended that governments refer the draft articles as developed at the April Reykjavik and the May London meetings to a Conference of Governments to be convened by the Government of the United Kingdom in consultation with the Secretary-General of the United Nations before November 1972 for further consideration with a view to opening the proposed convention for signature at a place to be decided by that Conference, preferably before the end of 1972. This Conference of Governments, as already noted, was held at London, October 30 to November 13 and text was adopted and submitted to governments with the recommendation that it be opened for signature beginning December 29, 1972.

Domestically, U.S. legislation to provide for the monitoring and regulation of dumping into U.S. waters and the contiguous zone, and of the transportation of material from the United States for dumping into the high seas was enacted into law on October 23, 1972. This legislation, known as the "Marine Protection Research and Sanctuaries Act of 1972 (PL 92-532)" requires Federal permits for

any such dumping and empowers the Administrator of the Environmental Protection Agency to prohibit all dumping of certain materials and to designate safe disposal sites for others. The Act also provides that the Secretary of the Army (through the Corps of Engineers) shall be responsible for issuing permits governing the ocean dumping of dredged materials, provided that such permits conform to criteria established by EPA.

The Environmental Protection Agency also has been accorded an expanded role in matters related to ocean dumping under the terms of the Federal Water Pollution Control Act Amendments of 1972. Section 403(c) of the Act provides for the promulgation, within one hundred and eighty days, of guidelines for determining degradation of the territorial seas, the contiguous zones and the oceans.

The text of the proposed convention is compatible with the new domestic legislation.

Moreover, if the convention is broadly adhered it should do a great deal to regulate and harmonize ocean dumping practices throughout the world, make foreign practices compatible with those adopted by the United States and most importantly, contribute to the preservation of the marine environment.

Minor additional U.S. legislation is required in conjunction with the convention to extend the domestic law and regulation to (a) all U.S. flag vessels transporting wastes for dumping from ports of non-party states and (b) the various forms of oil referred to in Annex I, the dumping of which is prohibited.

SOURCES

Council on Environmental Quality, *Ocean Dumping: A National Policy* (1970).

Hearings on Ocean Waste Disposal Before the Sub-Committee on Oceans and Atmosphere of the Senate on Commerce, 92d Cong., 1st Sess. (1971).

Marine Protection, Research and Sanctuaries Act of 1971, S.R. 9727, 92d Cong., 1st Sess.

Report of the Intergovernmental Meeting on Ocean Dumping, Reykjavik, 10-15 April 1972.

Report of the Intergovernmental Meeting on Ocean Dumping, London, 30 and 31 May 1972.

Report of the United Nations Conference on the Human Environment, held at Stockholm 5-16 June 1972, A/Conf. 48/14.

Marine Protection, Research and Sanctuaries Act of 1972, 92d Cong., 2nd Sess. Public Law 92-532, October 23, 1972.

Amendments of 1972 to The Federal Water Pollution Control Act.

III. Provisions of the Convention

The product of the recent London Conference, was a Final Act which contained a resolution recommending that the Convention be opened for signature in depository capitals for one year (beginning December 29, 1972). Annexed to the Final Act is the text of the Convention, a Technical Memorandum of Agreement of the Conference, and a resolution of the Conference on assistance for training of personnel, supplying of equipment and other measures of assistance. All of these documents may be found in Attachment I to this statement.

The Convention is designed to regulate dumping at sea from vessels, aircraft, platforms or other man-made structures. Dumping is defined as the deliberate disposal of wastes or other matter, including the deliberate disposal at sea of vessels, aircraft, platforms, or other man-made structures at sea. It does not include the disposal at sea of wastes or other matter incidental to, or derived from the normal operations of vessels, aircraft, platforms or other man-made structures at sea, and their equipment. Neither do the prohibitions against dumping or the requirements for permits apply where the safety of human life or a vessel or aircraft at sea is threatened. Also the Convention does not apply to the disposal of wastes or other matter directly arising from or related to the exploration, exploitation or off-shore processing of seabed mineral resources.

"Vessels and aircraft" under the convention means waterborne or airborne craft of any type whatsoever. This expression includes air cushioned craft and floating craft, whether self-propelled or not. "Sea" means all marine waters other than the international waters of states.

Annex I.—Article IV of the Convention prohibits the dumping of any matter contained in Annex I to the Convention. Annex I includes organohalogen compounds, mercury and cadmium and their compounds, persistent plastic and

synthetic materials which may materially interfere with fishing, navigation activities and other legitimate uses of the sea; oil and oily mixtures of various types when taken on board for the purpose of dumping, and agents of biological and chemical warfare. The Annex also includes high-level radioactive wastes or other high-level radioactive matter, defined on public health, biological or other grounds, by the competent international body in this field, at present the International Atomic Energy Agency, as unsuitable for dumping at sea. The IAEA, however, has not yet defined high level radioactive wastes or other high-level radioactive matter. Accordingly, the United States delegation submitted the following interpretative statement to the London Conference that framed the Treaty:

"With reference to Item 6 on Annex I, the United States wishes to note that there is no internationally accepted definition of high-level radioactive wastes. The United States defines high-level radioactive wastes as aqueous wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuels. Until an internationally acceptable definition is negotiated under the auspices of the International Atomic Energy Agency, the United States plans to govern its activities on the basis of the definition stated herein."

The strictures of Annex I to the Convention do not apply to substances which are rapidly rendered harmless by physical, chemical or biological processes in the sea, provided they do not make edible marine organisms unpalatable or endanger the health of humans or domestic animals. Neither do the prohibitions apply to wastes or other materials (e.g., sewage sludges and dredged spoils)" containing "trace" quantities of mercury, cadmium, or organohalogens and their compounds or of the oil and persistent plastic or synthetic substances mentioned above.

The report of the Technical Working Party which was established at the London Conference contains a description of "trace" contaminants. To be regarded as "trace" quantities such contaminants must occur in such small amounts, or forms, that the dumping of them into the sea would neither cause significant undesirable effects, or create the possibility of harm associated with bio-accumulation of marine organisms (especially food species).

In the preparatory work for the Convention and during the early discussions regarding the annexes, Japan made a specific plea that it be permitted to dump wastes containing small quantities (greater than trace amounts) of mercury and cadmium into the ocean in a carefully controlled manner. The Japanese representatives explained that the quantities of mercury and cadmium in these inorganic wastes far exceeded quantities known to exist in normal harbor dredged soils. They stated that this exception would be required for approximately five years during which time the industries responsible for the production of these wastes would change this production process and eliminate the problem of waste production. It had been agreed previously at the earlier Reykjavik meeting that this situation could be accommodated through a footnote to Annex I, which would indicate that for five years such wastes containing small quantities of mercury and cadmium compounds could be dumped at sea in depths not less than 4,000 meters in such a way as not to harm the marine environment or seabed resources. At the London Conference, however, some delegates objected to inclusion of this footnote and, it was agreed instead that the matter should be addressed in the Technical Memorandum of Agreement which is annexed to the Final Act of the Conference. The substance of this Technical Memorandum, which was thoroughly discussed at the Conference, has the operative effect of permitting Japan to dispose of such wastes in the manner proposed, and in minimum depths of 3,500 meters for a period of five years.

Annex II.—The London Convention requires that a prior special permit must be issued by the applicable authority of each party concerned for each dumping of substances listed in Annex II. Annex II includes wastes containing "significant amounts" of arsenic, lead, copper, zinc (and their compounds), organo-silicons, cyanides, and fluorides; pesticides and pesticide by-products not covered by Annex I and containers, scrap metal and bulky wastes which might present a "serious obstacle" to fishing or navigation. Annex II also provides that "in the issuance of approvals of permits for dumping of large quantities of acids and alkalis, consideration shall be given to the possible presence in such wastes" of the chemical substances listed above and of beryllium, chromium, nickel and vanadium (and their compounds).

Materials listed on Annex II in many cases can be dumped more safely in specially-selected areas than in other sensitive locations, such as estuarine spawning and feeding grounds.

Discussion under Annex I regarding high-level radioactive wastes prompted Spain to propose at the recent London Conference that Annex II include medium- and low-level radioactive wastes, thus requiring a special permit to permit the dumping of such materials. This was accepted by the Conference. The lack of internationally-agreed definitions of low- and medium-level radioactive wastes lead the Technical Working Group to refer to "radioactive wastes or . . . matter not included in Annex I." It was the consensus, however, of the London Conference that, although all substances have some "radioactivity", the provisions of Annex II should not be extended to the absurd length of covering absolutely all substances. Moreover, the IAEA is cited in Annex II in the same manner as in Annex I, as the competent international body that should offer guidance in this field. Thus, the IAF, after appropriate study, would advise as to what radioactive wastes should be subject to special permits; those not treated by the IAEA would be subject to a general permit.

Other Dumping and Annex III.—The London Convention, like the earlier Reykjavik draft, requires that all other dumping not covered by Annexes I and II be conducted under prior general permits or approvals issued by the authorities of the party concerned, and that records be kept by each party of the nature and quantities of all matter dumped, and the location, time and method of dumping. Moreover, in establishing criteria for the granting of dumping permits, each party is required to consider a detailed set of factors contained in Annex III, including factors related to the physical, biochemical and biological characteristics of the material; the amount, composition and rate of dumping; and the location and characteristics of the dumping site, and surrounding waters and currents; the method of packing and containment; the probable effects on amenities and other uses of the sea; and alternative means of disposal.

During the London Conference that produced the Convention, a number of delegations advocated drafting Annex III in a very detailed fashion to provide all nations, especially those with limited marine pollution expertise, with as much guidance as possible. Other delegations asserted that only general guides were necessary, that the Convention should not include a primitive marine pollution primer, and that generally accepted scientific considerations could be easily taken from standard reference texts. The Technical Committee at the Conference chose to include in the Annex a rather expansive list of items and examples.

Portugal, for example, was quite concerned that a proposed dumping site be studied carefully before a permit for dumping at that site was issued. Although several delegations noted that Annex III, Part B covered this aspect, Article IV, 2 and subparagraph B, 9 of Annex III were inserted into the Convention's text and the Annex to account for Portugal's concern.

A number of delegations were also interested in emphasizing the effect of dumping on fishery resources and other similar marine resources, such as shellfish and seaweed. Subparagraph C, 2 was written to emphasize the importance of considering these living resources before permitting any dumping.

Other Provisions Including Emergency Clause

The Convention provides for an initial meeting of representatives of the parties within three months of the entry into force of the Convention, and subsequent meetings thereafter no less frequently than once every two years. At their first meeting the parties are to designate an Organization to perform secretarial duties and to receive reports from individual parties and regional dumping authorities. The parties may also amend any of the Annexes upon approval by two-thirds of their number; however, no such amendment would come into force for any party which declares its rejection of the Amendment. The procedure for amendment of the body of the Convention is similar, but requires the convening of a special Conference at the request of two-thirds of the parties.

Under the Convention, each party is further required to "use its best endeavors" individually, and in concert with other nations, to promote the effective control of all sources of pollution of the marine environment. They also pledge themselves to take all practicable steps to prevent the pollution of the sea by the dumping of wastes or other matter that is liable to create hazards to human health, to harm living resources and marine life, or to damage amenities or to interfere with other legitimate uses of the sea. The parties undertake to "har-

monize" their practices to prevent pollution by dumping. They also undertake to consult with each other closely, (drawing on the advice of the appropriate scientific bodies) on the implementation of the Convention—and most especially its scientific and technical aspects.

Each party acknowledges that "in accordance with the principles of international law, States bear responsibility for damage to the environment of other States or to any other area of the environment caused by dumping of wastes and other matter, and undertake to develop procedures for the assessment of liability and for settlement of disputes regarding dumping."

The Convention also encourages parties in common geographical areas to enter into regional dumping agreements which may apply more stringent criteria or prohibitions to dumping within the region. All parties are required to cooperate with parties to such regional agreements, in order to harmonize the procedures to be followed by the contractual parties to the different conventions concerned.

Further, each party is required to take appropriate measures to ensure compliance with the provisions of the Convention by all vessels and aircraft registered in its territory, or loading in its territory matter to be dumped, and by all vessels, aircraft, and fixed and floating platforms under its jurisdiction believed to be engaged in dumping. However, the Convention does not apply to vessels and aircraft "entitled to sovereign immunity under international law." Rather it obliges parties to take appropriate measures to see that such vessels and aircraft which they own and operate "act in a manner consistent with the object and purpose" of the Convention, and to inform the Organization called for by the Convention accordingly.

The working papers for the London Conference did not contain any mention of an emergency exception clause; a provision permitting the dumping of a prohibited substance as defined in Annex I to the Convention should extenuating circumstances justify such disposal under carefully controlled procedures. The Oslo Convention on the Control of Marine Pollution by Dumping from ships and aircraft does, however, contain an emergency clause. In particular, in emergency where land disposal poses unacceptable danger or damage, a party is obliged to consult the Commission (secretariat for the Oslo Convention) and thereafter inform the Commission of the steps taken.

During the recent London Conference it was clear, after some debate, that the concept of an emergency clause—with proper safeguards—was acceptable to most delegations. The formulation agreed upon is found in Article V, Paragraph 2 of the Convention, which provides that a Party may: "issue a special permit as an exception to Article IV Ia, in emergencies, posing unacceptable risk relating to human health and admitting no other feasible solution." Before doing so, however, the party is obliged to consult any other country or countries that are likely to be affected and the Organization to be established by the Convention. Consultation in this case has been interpreted to mean more than advising or informing; it is intended to include at least a two-way exchange. (It also was agreed that such consultations could be performed by telephone or telegram if time is very limited.) The Organization, in turn, after consulting other interested parties or organizations is to promptly recommend to the party the most appropriate procedures to adopt. The party is expected to follow these recommendations to the maximum extent feasible "consistent with the time within which action must be taken and with the general obligation to avoid damage to the marine environment" and is obliged to inform the Organization of the action it takes.

The United States accepted this formulation with the understanding that situations would be covered by the clause which did not necessarily require immediate action. In particular, and for the record, the U.S. delegate stated:

"The United States understand that the word "emergency" as used in Article V, 2 (b), refers to situations requiring action with a marked degree of urgency, but is not limited in its application to circumstances requiring immediate action."

In the formulation of the emergency clause, it was understood that "human health" as referred to in the clause would include those aspects of the environment which could affect the health of present or future generations. It also was agreed that the other means of disposal that might be considered as an alternate to ocean dumping in such situations should be within some bounds of reason regarding costs and the phrase "admitting no other feasible solution" in Article V was accepted as reflecting that understanding. However, concern was expressed several times by some delegations that this economic criterion could be exploited beyond reason, and could make the Convention useless. The consultation with the Organization and with other parties now called for by the Article was accepted as a practical means of limiting such unreasonable use of this clause.

IV. Environmental Impact of the Proposed Convention

It is difficult, if not impossible, to express the probable environmental impact of the subject Convention in quantitative terms, since the precise effects will depend on the number of States that ultimately participate in the Convention, the manner in which they carry out their responsibilities under the Convention, and the nature of the ocean dumping activities that they might have engaged in the absence of a Convention.

One way to try to assess the overall environmental effects of the proposed Convention is to first describe in general terms, some of the effects that have been anticipated if ocean dumping were allowed to continue, without any restraints and at ever increasing rates over the next several years. This is done in the following paragraphs and these implications also were extensively discussed from the standpoint of U.S. operations in the October 1970 report to the President of the Council on Environmental Quality entitled "Ocean Dumping—A National Policy". This discussion is then followed with an analysis of some of the environmental effects of specific substances that have been a particular basis for concern.

A. Effects of Unregulated Ocean Dumping

The oceans are being used continually as receptacles for sizeable quantities of wastes dumped from vessels at sea. The report of the Council on Environmental Quality indicated that over 48 million tons of waste materials were dumped in one year from U.S. sources alone. Based on past dumping, and on projected population and development trends, the CEQ concluded that, if unregulated, such dumping in the seas would probably increase substantially in the foreseeable future. Moreover, and perhaps more significantly, the report stated that some wastes have been disposed of either in concentrations at toxicity levels or in compositions that have been a basis for increasing concern.

1. Types of Materials Dumped.—Dredge spoils account for approximately 80% by weight of all material dumped by the U.S. at sea. These spoils consists of sediments dredged to improve and maintain navigation channels, and contain alluvial sand, silt, clay and municipal or industrial waste sludges. Within the United States, the U.S. Corps of Engineers has estimated that over one-third of these spoils contain pollutants from industrial, municipal and agricultural sources, including toxic heavy metals and waste substances capable of substantially reducing the oxygen content of receiving waters. The CEQ estimated that the demands of increasing marine commerce, including a need for new deep-water harbors and deeper existing channels, would probably increase the amount of dredge spoils dumped at sea over the next decades.

Industrial wastes constitute about 10% of dumped materials within the U.S. These wastes originate from a variety of manufacturing and processing operations, including petroleum refining, steel and paper production, pigment processing, insecticide-herbicide-fungicide manufacturing, chemical manufacturing, oil-well drilling operations, and metal finishing, cleaning and plating processes. Over 50% of these materials are waste acids from steel mills and other manufacturing operations; over 10% are refinery wastes, which may contain toxic amounts of cyanides, heavy metals and chlorinated hydrocarbons; 30% are wastes from pulp and paper mills, containing "black liquor" and other potentially toxic organic constituents; and much of the remainder consists of wastes from chemical manufacturing plants and laboratories, which may contain arsenical and mercuric compounds and other toxic chemicals. Since the rate of increase of industrial production in the developed countries generally exceeds population growth, and since a substantial proportion of the world's industrial production occurs near marine areas, the volume of dumping of industrial wastes, if unregulated, was estimated by CEQ to increase substantially over the years.

Sewage sludge, the solid by-product of municipal waste water treatment, accounts for nearly 10% of U.S. dumped wastes. Thus sludge generally contains significant concentrations of oxygen-demanding organic materials, and may contain pathogens and quantities of copper, zinc, barium, manganese, and molybdenum, depending upon the type of waste water treatment and the degree to which domestic and industrial contaminants have entered the system. The CEQ has projected substantial increases in the amounts of sewage sludge likely to be dumped in future years, and has estimated that coastal dumpings from U.S. sources will increase from 1.4 million tons in 1970 to about 2.1 million tons in 2000.

Construction and demolition debris, consisting of masonry, tile, stone, wood and plastics, excavation dirt, and the like, is dumped in significant quantities in the oceans near some U.S. municipal areas, but is generally thought to contain inert and non-toxic substances. Other solid municipal wastes, however, may contain appreciable quantities of nutrients, oxygen-demanding materials, and heavy metals. These wastes also contain a large proportion of paper, wood, plastics and rubber, which may rise to the surface and create safety and aesthetic problems. Only a small portion of solid municipal wastes is presently dumped at sea; however, the CEQ anticipated that the use of the oceans as receptacles for these wastes is likely to increase substantially as land disposal becomes more costly and politically inexpedient.

Munitions, including unserviceable or obsolete shells, mines, rocket fuels and propellants, have been dumped at sea in significant quantities since World War II, often in scuttled Liberty ships. Such devices contain amounts of lead, nickel, bronze and other potentially toxic metals, as well as potentially toxic undetonated highly-reactive explosives.

Finally, the oceans have been used, to a moderate degree since World War II, as dumping grounds for nuclear waste products, although the U.S. in recent years has confined such dumpings to a minimum. Moreover in recent years, the volume of dumped radioactive materials has sharply declined as land disposal methods have been developed and increasingly relied upon. Dumped wastes have included liquid products of low radioactivity, including processing and cooling waters from reactor operations, and solid wastes produced by nuclear contamination and medical and research uses.

Ocean-dumped wastes of all kinds are primarily dumped in bulk, or in containers which are sunk by weighting or rupturing at the surface. In U.S. dumping sites, dredge spoils are typically dumped in relatively shallow waters within a few miles of the coast, industrial and municipal wastes from 15 to 100 miles offshore, and radioactive and explosive wastes in areas with depths of 6,000 feet or more.

2. General Environmental Effects.—The environmental effects of the dumping at sea of these waste materials are not yet fully known. However, there is broad agreement that unrestricted dumping presents a potentially serious threat to marine life systems and to human uses of marine resources.

a. Implications for marine life

Toxicity.—Fish and other marine organisms are sometimes killed directly by ingestion of or contact with lethal concentrations of toxic heavy metals or persistent organics in dumped material. Even more serious, however, are the sublethal effects on marine life of the dumping of toxic and irritant substances. The presence of such materials may interfere with chemo-receptor mechanisms, reduce resistance to stress and infection, and interfere with respiratory and filtering organs. These effects may be particularly serious for higher predators as a result of biological concentrations of toxic substances contained in organisms on which they feed. Furthermore, many of these substances are believed to have carcinogenic effects on marine life forms.

Oxygen Depletion.—Organic wastes, sulfides, and some metals, when dumped into the ocean, require oxygen during decomposition. As a result, the dumping of these wastes in bodies of water tends to deplete the oxygen supply necessary for the support of marine life. Furthermore, the death of organisms from oxygen depletion may lead to the production of malodorous hydrogen sulfide and methane gas by anaerobic bacteria. Some materials require large amounts of oxygen during decomposition, and may continue to deplete dissolved oxygen in a marine area long after it is dumped.

Biostimulation.—Wastes rich in such nutrients as phosphates and nitrates may cause biostimulation, or accelerated growth of algae and other plant life, or it may selectively stimulate undesirable species. Excessive plant growth may lead to oxygen depletion during decomposition, the deposit of rotting algae on beaches, and the disruption of bottom-dwelling organisms by deposits of algal mud.

Changes in Habitat.—The dumping of wastes may also cause physical changes in bottom sediments which disrupt and later marine ecosystems. Sewage sludge and polluted dredge spoils, in particular, have been found to cause such changes in the characteristics of bottom layers as to obliterate certain life forms in the dumping area or to upset the ecological balance of the area by stimulating other life forms.

Shock.—Finally, marine organisms, particularly those with swim bladders, may be killed by shock waves from the detonation of dumped munitions.

b. Effect on human activities

Human health may be directly threatened by the ingestion of seafood in shallow-water areas where material containing toxic substances and pathogenic organisms is dumped. Fish and shellfish may become carriers of hepatitis, polio and other human pathogens by contact with sewage sludge.

Recreational and aesthetic uses of coastal areas also can be disrupted by ocean dumping. Many beaches near metropolitan areas have been closed on account of the high pathogen content of coastal waters from sewage and waste deposits, or where toxic waste materials have been dumped. Unpleasant odors may be caused by the decomposition of algae and by anaerobic bacteria.

Furthermore, ocean dumping may cause substantial economic losses through the destruction of fish and shellfish colonies, their contamination with toxic substances or pathogens, or the tainting of their flesh from contact with dumped materials. The cleaning up of polluted beach and coastal areas is also very costly, particularly in densely populated metropolitan areas where dumping tends to be concentrated. Floating and suspended materials may interfere with fishing and navigation activities, and may foul or damage vessels and equipment.

The following excerpts from the CEQ report of 1970 are designed to give just a few examples of what the magnitude of some of these effects can be:

“* * * Effluents from land-based sewage outfalls are the major source of coliform bacteria, but ocean dumping of sewage sludge is also significant. The FDA found that ocean bottom sediments up to 6 miles from the New York Bight sludge dump contained coliform counts that exceeded permissible levels. On May 1, 1970, this area, 12 miles in diameter, and a similar area off Delaware Bay were closed to shellfishing. Clams harvested for sale in the New York Bight contained coliform bacteria 50 to 80 times higher than the standards set by FDA.

“Hepatitis virus are carried by shellfish. A 1961 outbreak of infectious hepatitis was traced to raw shellfish taken from Raritan Bay, N.J. Shellfish have been collected with polio virus concentrated to at least 60 times that of surrounding waters.

“* * * Many beaches have been closed to swimming because of the high coliform content of the water. Most closed beaches are near large metropolitan areas, such as San Francisco and New York. Floating materials, such as solid waste and oil, pose a major threat to amenity values. Rotting algae and anaerobic waters cause unpleasant odors and visual pollution. And debris are often a hazard to small boats.

“* * * Significant economic losses result from ocean pollution. A major loss is the commercially valuable fish or other seafood species killed directly or indirectly or rendered inedible. They represent serious social and financial losses because of the near subsistence level of many fishermen.

“In 1969, the total catch of crabs, lobsters, shrimp, oysters, clams, and scallops was 729 million pounds. Because one-fifth of the Nation's 10 million acres of shellfish beds are closed due to contamination, it can be estimated that the total catch would have been 181 million pounds higher. This estimate is probably low, since the closed areas are particularly productive—in lush estuarine systems in close proximity to large cities where they would have been harvested intensively. Figure 1 indicates the financial impact assuming a loss of one-fifth the potential catch.

“The loss is well documented in San Francisco Bay. Prior to 1935, the annual commercial harvest of soft shell clams was between 100,000 and 300,000 pounds. Today clam-digging is virtually nonexistent because of pollution. The annual commercial landings of the shrimp fishery prior to 1936 were as high as 6.5 million pounds; landings in 1965 were only 10,000 pounds * * *.”

3. *Effects of the Dumping of Specific Substances.*—Admittedly, ocean dumping only has contributed partially to some of the episodes described above and our knowledge of the specific effects on the marine environment of the dumping of various substances is still very tentative and incomplete. Indeed one of the major purposes of the recently enacted “Marine Protections, Research and Sanctuaries Act” (as the title suggests) is the commencement of a major coordinated research effort by various Federal agencies into these environmental effects and Title II of that Act specifically directs the Secretary of Commerce, in conjunction with other agencies, to undertake a “comprehensive and continuing program of monitoring and research” in this regard. Similarly, one of the more immediate objectives of the 1972 Stockholm Conference on the Human Environment was the encouragement of worldwide monitoring and research programs to determine the presence and effect of various pollutants in the marine environment. Hopefully,

the proposed convention will contribute to the development of a greater understanding in this area by encouraging nations to exchange their experiences and to carry out their dumping operations in a careful, analytic manner while the necessary research progresses.

Some work, of course, has already been done by international groups of experts to explore the effects of ocean pollution. Attachment III contains a hazard profile of some 200 substances prepared by a panel of experts of the Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), rating the effects of each substance in five important aspects: bioaccumulation, damage to living resources, hazards to human health, through oral intake and through skin contact and inhalation, and reduction of amenities. The Environmental Protection Agency has pointed out that the hazard profiles developed by GESAMP were originally developed to deal with the problem of chemical tank machines from bulk chemical ships and marine casualties. Consequently the feasibility of their direct application to ocean dumping is not clear, i.e. single incident evaluations being used for repeated discharge situations. However, the annex should provide the reader with useful background information. Attachment IV contains an analysis of the environment effects of over 25 substances or groups of substances prepared as part of the working documents for the UN Stockholm Conference.

With the various caveats, outlined above the following is a more detailed description of the apparent effects of some of the most hazardous substances that have been a cause of some concern.

a. Metal and metal compounds

1. *Mercury.*—Metallic mercury has long been thought to be an environmentally inert substance which would settle to the bottom of water bodies and cause few harmful effects. It is now apparent, however, that mercury introduced into the environment can easily be transformed into highly toxic forms which may accumulate in sediments and organisms in dangerous concentrations.

Metallic mercury can be transformed by bacterial action into methylmercury, a highly toxic compound which persists in the marine environment, is assimilated by aquatic plants and ingested by various forms of marine animals, and tends to be retained for long periods within organisms. As a result, methylmercury can be readily ingested by humans eating contaminated fish and shellfish, and most of the methylmercury so ingested may be absorbed and concentrated in vital organs. In particular, methylmercury appears to concentrate in the brain, liver, kidneys and red blood cells, and remains in the system for a substantial time before it is naturally eliminated. It is also readily transmitted into the fetus of an exposed mother.

Bodily disorders which may be traceable to methylmercury poisoning include sensory disorders, genetic damage through disturbances in the mechanisms of cell division and chromosome breakage, and birth defects and brain damage in prenatally exposed children. While these effects in humans are not yet fully validated, it is clear that methylmercury has a serious potential for damage to human health. Similar health hazards may be presented by ingestion, inhalation or absorption through the skin of significant amounts of other organic mercury compounds, and inorganic mercury salts or vapors.

Methylmercury and other mercury salts may also cause similar toxic effects in domestic animals, fish and planktonic life and may interfere with reproduction and photosynthesis. Mercury concentrations are particularly hazardous at higher levels in the food chain, such as predatory birds.

One of the best known and most tragic cases of mercury poisoning in recent years took place in Japan. Between 1953 and 1960, 111 persons were reported to have been killed or to have suffered serious neurological damage near Minamata, Japan, as a result of eating fish and shellfish caught in areas contaminated by mercury. Among these were 19 congenitally defective babies whose mothers had eaten the fish and shellfish. Subsequently, at Niigata 26 more cases of mercury poisoning were noted. The fish eaten by the affected Japanese contained from 5 to 20 parts per million of methylmercury.

It should be noted that the Environmental Directorate of the Organization for Economic Cooperation and Development has performed an exhaustive study of the existing knowledge on the overall biological impact of mercury through its Sector Group on Unintended Occurrence of Chemicals in the Environment. The conclusions of that report are as follows:

“Present knowledge of the biological impact of mercury at micro and macro level as described in this report, leads to the following conclusions:

“(a) The total global level of mercury in the environment is of less importance than the fact of its uneven geographical distribution. Concentrated industrial sources of mercury emissions, and the disposal of mercury contaminated muds and sediments in particular constitute major problems. It must also be borne in mind that with changes in technology, new pathways for the accumulation and redistribution of mercury in the environment must be considered.

“(b) Because of the widespread but as yet incompletely understood possibilities of the methylation of inorganic mercury by micro-organisms in the natural environment, any addition to the environmental mercury burden must be considered to represent an additional risk to the well-being of some species in the environment, if not to man himself.

“(c) The average long-term intake of mercury by humans not otherwise exposed to mercury, does not appear to constitute a general health hazard at the present time. Population groups in which predatory fish, or fish and shellfish otherwise contaminated, constitute a major proportion of their diet, are however particularly at risk.

“(d) Methylmercury is highly toxic to many living species, the critical organs being the brain and the nervous system.

“(e) Laboratory experiments on animals indicate that even at concentrations below those which cause manifest functional damage, methylmercury can bring about losses from the irreplaceable reservoir of brain cells.

“(f) Epidemics of poisoning by alkylmercury (particularly methylmercury) compounds have occurred in the past, due to ignorance or misuse, and these continue to occur. In all several hundred, if not thousands of deaths may have been involved. Unborn children are particularly at risk because of the concentration of the mercury in the fetus.

“(g) The possibility of future repetition of such catastrophes as that in Iraq will remain so long as stocks of methylmercury fungicides remain. Unofficial estimates suggest stocks of more than a hundred tons of this material, which would be enough to cause another 50 catastrophes of the Iraq type.

“(h) Laboratory experiments have demonstrated that organic mercury at relatively low concentrations, can produce genetic aberrations in some species. Although this has been shown to occur in man (Skerfving, 1972), further elucidation of the likelihood of these effects in humans and higher organisms is necessary. The opportunity of examining damaged human material from the Iraq catastrophe may provide valuable information in this regard.

“(i) Although there is a substantial body of knowledge of the damage in patients showing clinical symptoms of organic mercury poisoning, little is known concerning the damage sustained by those showing subclinical symptoms. The mechanism and early diagnosis of the delayed onset of mercury poisoning remain unknown.

“(j) There is no simple prescription for evaluating the risks of damage to species in the environment, including man, consequent on the existence of mercury. The problem is of its nature a complex one.

“(k) In terrestrial systems it has been shown that the application of methylmercury as seed dressing in accordance with prescription may give rise to increased mortality of seed eating birds and birds of prey. Effects of mercury on reproduction in wild birds has not been demonstrated so far.

“(l) Aquatic ecosystems may become exposed to excessive levels of mercury in areas where it is disposed of in surface waters. It has been shown that this may give rise to increased risks to various organisms including phytoplankton fish and other vertebrates.

“(m) Legislative controls of mercury use and discharge (not specifically reviewed in this report) have had a beneficial effect on some environmental mercury levels, both in water and in aquatic and avian species.

“(n) Recent findings indicate that a possible functional relationship might exist between mercury and selenium, possibly resulting in protection against the toxic action of methylmercury in the body. This may be important in relation to the high mercury and selenium levels found in marine mammals.

“(o) Particularly with respect to marine mammals, the question can be raised to what extent any possible biochemical protective mechanism against mercury toxicity will be functioning when the rate of exposure increases. The possibility will have to be considered that for certain organisms, especially those whose ability to excrete mercury compounds is limited (e.g. seals) even a minor increase in the environmental load of mercury could represent a serious hazard.

The extremely high levels in the brains of adult seals which were found merit further attention in this respect.

“(p) Methylmercury is shown to affect the detoxification systems of cells. The possibility must, therefore, be considered of methylmercury acting synergistically with other foreign substances and, by changing their metabolism, render them harmful or increase their toxicity.”

2. *Cadmium*.—Cadmium reaches the marine environment from a variety of industrial processes, including the manufacture of storage batteries, plastics and petroleum products. Like mercury, cadmium compounds tend to accumulate in marine life, and to be ingested by humans consuming fish and shellfish. Only a fraction of the cadmium taken into the body is actually absorbed, but ingested cadmium appears to accumulate in the kidneys and the liver and is not efficiently excreted. While the effects of cadmium accumulation in humans are not fully known, there is evidence that exposure even to low-levels may be associated with hypertension, cardiovascular disease, and perhaps to cancer.

Cadmium is apparently a serious hazard to marine life. Cadmium chloride is rated by the GESAMP experts as a bio-accumulate substance which is highly toxic to living organisms, and ingestion may be lethal to fish at concentrations of fractions of parts per million.

3. *Lead*.—Lead compounds may become biologically concentrated at all levels of the aquatic food chain when deposited in a marine area in significant amounts. The presence of such concentrations in marine waters may cause death to fish by suffocation through the formation of mucus over the body and gills, and may cause blood cell damage.

Lead can be a serious health hazard to humans when absorbed in sufficient quantities over an extended period. Chronic lead poisoning tends to produce gastrointestinal and urinary tract disorders, anemia and stippled blood cells, headaches, and may even result in coma and death. However, it has apparently not yet been established that ingestion of lead-contaminated fish is a significant cause of lead poisoning in humans. For further details the reader is referred to the monography “Hazards of Lead In The Environment, with particular reference to the Aquatic Environment” by Victor Lambon and Benjamin Lim, Federal Water Quality Administration, U.S. Department of the Interior, August 1970.

4. *Arsenic*.—Arsenic is a well-known cumulative toxin used in many industrial processes. Arsenic compounds tend to be persistent in the aquatic environment, to accumulate in sediments, and to concentrate in aquatic organisms. Relatively small concentrations may produce toxic or lethal effects on various fish, benthic organisms and food chain organisms when exposed over even short periods. In humans, toxic effects may be caused either from ingestion or skin-absorption, resulting in concentrations in the liver, kidney and spleen; elimination through urinary excretion is generally slow and incomplete. Cancer, liver damage and heart ailments may be produced.

5. *Zinc*.—Zinc occurs in the marine environment as a result of industrial effluents and the dumping of dredge spoils and other materials. Zinc is an essential nutrient for most life forms and where it does not exist in sufficient quantities, there is cause for concern. However, the element can have toxic effects in sufficient concentrations. Six grams of zinc chloride and 45 grams of zinc sulfate have been reported to be fatal to humans, and sub-lethal concentrations may interfere with iron metabolism. Fish may exhibit toxic reactions and gill damage when significant zinc concentrations are present. Zinc seems also to concentrate in shellfish, but the evidence of harmful effects on such organisms is not conclusive. Furthermore, it is unclear as to whether any significant human health hazard may be produced by food chain concentration in the marine environment.

6. *Beryllium*.—Beryllium is used in electroplating processes and as a catalyst in the manufacture of organic chemicals. Beryllium does not appear to be a severe toxin when ingested, although it may cause pulmonary problems if inhaled directly. Only a small proportion of that ingested is absorbed, and that is rapidly excreted. There is also no evidence that beryllium is bioaccumulative in the aquatic environment. However, beryllium appears to be toxic to terrestrial plants, and it is possible that it would have similar toxic effects on aquatic plants.

7. *Chromium*.—Chromium is also found in industrial wastes. Chromium appears to concentrate in planktonic life and aquatic plants, and may substantially decrease the rate of photosynthesis in concentrations of as little as 1 milligram per liter. On the other hand, salt-water fish appear to be able to tolerate sub-

stantial concentrations for extended periods of time. In humans, chromium may be linked to skin disorders, lung cancer and liver damage.

8. *Nickel*.—Nickel appears to be similar to chromium in its toxicity and biochemical actions. Dermatitis and cancer may be associated with nickel concentrations in humans. It generally has low toxicity in the aquatic environment, but some of the lower forms of life appear sensitive to it.

9. *Copper*.—Copper compounds appear to be biologically accumulative in the marine environment, but their toxic effects are not fully understood. On the other hand, concentrations of copper found in coastal waters in the New York City area may have destroyed bottom-dwelling clams and worms, and substantially inhibited photosynthesis in aquatic plants. The CEQ report of 1970 on Ocean Dumping notes that

"Copper was found in the waters of the New York Bight in concentrations greater than 0.120 milligram per liter. These concentrations, found throughout the water column, indicate widespread copper contamination. Concentrations of 0.1 milligram per liter killed soft clams in 10–12 days. Concentrations of 0.05 milligram per liter killed polychaete worms in 4 days. . . . Concentrations of 0.1 milligram per liter inhibited photosynthesis in kelp 70 per cent in 9 days."

10. *Vanadium*.—Little is known about the toxic effects of vanadium in the marine environment. High concentrations in humans may damage the gastrointestinal and respiratory tracts and inhibit cholesterol synthesis.

b. Crude, fuel, and lubricating oils

By quantity, petroleum and its products are probably the most widespread pollutants of the oceans. While the greatest volume of oil products discharged into the oceans from vessels is produced by maritime casualties or by such vessel operating procedures as tank washings and bilge pumpings, the dumping at sea of oily wastes generated on land may also cause potentially serious environmental effects.

Oil slicks may kill seabirds directly through ingestion, or indirectly through the coating of feathers, causing drowning, starvation or fatal loss of body heat. Fish and shellfish may be killed by the ingestion of toxic hydrocarbons in oily substances, or by the coating of epithelial tissues. Oil coating may taint the flesh of fish and shellfish, rendering them unfit for consumption, and may disrupt propagation and reduce resistance to infection and stress. Bottom-dwelling organisms are particularly subject to those effects, since toxic hydrocarbons may persist in bottom sediments long after surface slicks have disappeared.

Oil pollution may also severely damage algae and planktonic life, an important source of food and fish populations, and may alter the ecological balance of a marine area through changes in bacterial composition and interference with reaeration and photosynthesis.

One of the more exhaustive summaries of what is known about effects of oil on marine ecosystems appears as an appendix to Volume 4 of the "Final Environmental Impact Statement—Proposed Trans-Alaska Pipeline, U.S. Department of Interior 1972. That Appendix is reproduced in its entirety as Attachment V to this Statement.

c. Organohalogen compounds

Chlorinated hydrocarbons, such as DDT, dieldrin, endrin, polyhalogenated biphenyls, polychlorinated biphenyls, and toxaphene, appear to have acute and chronic toxic effects on marine life when exposed in sufficient concentrations. Some toxic effects on planktonic life, including decreased growth rates, developmental failures and increased mortality, have been observed under laboratory conditions; more important, perhaps, is the effect that concentrations in planktonic life have on organisms higher in the food chain. Laboratory experiments appear to demonstrate that crustaceans and mollusks suffer serious mortality increases and decreased growth rates with relatively small concentrations of DDT, polychlorinated biphenyls, chlorinated pesticides and other chlorinated hydrocarbons. These substances appear to concentrate in lipid fish tissues, such as the ovaries, and to cause serious reproductive failures. Seaweed, mollusks, crustaceans, fish and other life forms may also be killed by contact with significant concentrations of chlorinated hydrocarbons in dumping areas.

Deaths and severe reproductive failures of several species of birds have been traced to the concentration of chlorinated hydrocarbons in their tissues; in particular, widespread shell-thinning, mortality and population decline of certain species of fish-eating coastal birds, along the North and Baltic Seas have been

attributed to contamination of their food supplies by dieldrin, DDT and polychlorinated biphenyls. Similar incidents appear to have occurred among marine birds off the coasts of the United States, including disastrous reproductive failures in the marine ecosystems off Southern California.

d. Radioactive wastes

Radioactive materials in the marine environment may affect organisms by direct radiation, absorption through body surfaces, absorption through body surfaces, absorption through cell membranes, and ingestion from food and water supplies. In general, lower organisms seem to be more resistant to ionizing radiation than the higher vertebrates; for example, doses of 25,000–600,000 roentgens may be required to produce 100 per cent mortality among algae, while doses of a small fraction of these levels may produce the same effect among higher vertebrates. However, radioactive substances may concentrate in higher marine life forms by ingestion of contaminated lower organisms and might, if deposited on the oceans in sufficient quantities, render fish and shellfish hazardous for human consumption. The presence of significant amounts of radioactive materials in the marine environment might also lead to long-term genetic effects on its life forms.

A number of studies were conducted in the 1950's and 1960's to determine the condition under which low-level radioactive wastes might be dumped in the oceans without serious ecological danger. These studies suggested criteria related to such factors as the quantity of isotopes dumped in curies per year, the concentration in seawater, the depth of the disposal area, the limiting depth of human food organisms, and the characteristics of the bottom, surrounding waters and benthic life forms.

e. Biological and chemical warfare agents

These agents are of course designed to produce highly toxic or debilitating effects on humans or other terrestrial life forms. Their effects in the marine environment are very difficult to assess, and would vary tremendously, depending on the particular pathogen or chemical agent involved. Many chemical agents might produce severe localized toxic effects, but be neutralized fairly rapidly in the marine environment and produce no long-term effects; others may have great potential for long-term damage. Similarly, many biological agents might be expected to die quickly in saltwater, but any adaptive pathogen capable of completing a life cycle in the ocean environment might create very serious and widespread biological disruption. While it is, therefore, impossible to generalize about the effects of these agents on the oceans, it is safe to say that many agents may be expected to have serious potential for environmental disruption.

f. Other chemical compounds

The environment impact of several other groups of potentially toxic chemical compounds is not well known. Cyanides are among the most toxic of all industrial chemicals, and when directly ingested or inhaled in sufficient amounts may produce almost instantaneous collapse and respiratory cessation. Their effects in the marine environment are not well understood; however, relatively small concentrations may inhibit growth and have toxic effects on fish, but lower organisms seem more resistant to cyanide concentrations. Fluorides, when ingested in sufficiently high quantities, may also be toxic to humans, and in concentrations of hundreds of milligrams per liter may injure or inhibit the growth of terrestrial plants; on the other hand, moderate amounts in drinking water may have beneficial effects on human health. There is also limited data on the environmental effects of organosilicons; organosilicon ethers and esters may be toxic if inhaled, but polymeric silicones are relatively non-toxic and biologically inert.

Finally, as an overall comment not limited to a particular substance, the C'EQ report of 1970 on Ocean Dumping noted that "in laboratory experiments with polluted sediments from the New York Bight disposal area, the following sublethal effects were shown:

"Serious infections were found in native species.

"Bottom waters inhibited phytoplankton cell growth and division. (34)

"Lethal and sublethal effects from toxic wastes are complex and not well understood. But evidence is mounting that these effects may be widespread and very harmful to the marine environment. Their potential for deferred and long-range ecological damage must be taken into account in any program to control ocean dumping."

B. Impact of the London Convention—1. Annex I Materials.—As already noted, the London Convention would prohibit the dumping of organohalogen compounds, mercury and cadmium, as well as their compounds, persistent plastics and other persistent synthetic materials, various oils taken on board for the purposes of dumping, high-level radioactive wastes or other high-level radioactive matter defined by the IAEA as unsuitable for dumping at sea, and agents of biological and chemical warfare. The prohibitions would not apply to substances which are rapidly rendered harmless by physical, chemical, or biological processes and which do not render the flesh of edible marine organisms unpalatable or lead to a danger to human health or that of domestic animals.

This would presumably end the dumping by the parties of various potentially toxic or persistent substances which pose a distinct threat to the marine environment. On the other hand, the exception for non-persistent, non-toxic substances would fall within the judgment of the national permit-granting authorities, and it is possible that permits will be granted in some countries for the dumping of matter which others may regard as toxic or have concerns about. Relatedly, the parties could dump wastes containing "trace contaminants" or organohalogens, mercury and cadmium and their compounds, persistent synthetic substances and the various oils, whose dumping would normally be prohibited. Moreover, pursuant to the Technical Memorandum of Agreement and during an interim five-year period, wastes containing small quantities of inorganic mercury and cadmium compounds, which are solidified by integration into concrete, could be dumped in depths of not less than 3,500 meters "in conditions which would cause no harm to the marine environment and its living resources."

Here too the effects of allowing deep-water dumping for an interim five-year period would depend on the diligence with which national authorities observe the prohibition against harmful dispersals and the adequacy of the containerizing procedures. However, the other obligation on the parties to harmonize their policies and to consult regularly on implementation should go far in fostering uniformity in application under the treaty and should go far in assuring that its spirit is carefully observed. Like all activities under the convention, the interim dumping contemplated by the Technical Memorandum will be explicitly subject to the procedures for continuing review, consultation and assessment set forth in Article XIV of the Convention.

2. Annex II Materials.—The London Convention will require special permits from the authorities of the Party concerned for each dumping of scrap metal, containers and bulky wastes liable to sink to the bottom and to obstruct fishing and navigation; and wastes containing significant amounts of arsenic, lead, copper, zinc, organosilicons, cyanides, fluorides, pesticides and radioactive wastes or other radioactive matters.

These requirements should force domestic authorities of each Party to scrutinize each proposed dumping of the materials listed, to apply rational criteria in passing on applications, and to keep systematic records of how various types of potentially harmful wastes have been deposited in particular marine areas. This Annex admittedly, also leaves the regulation of such dumping to the discretion of domestic authorities, some of whom may be more liberal than others. And differences may arise in the way in which different countries view the potential harm of particular substances. Once again, however, the procedures for consultation and the obligation on the parties to harmonize their policies, should offset divergencies.

Annex II also requires that in granting permits for the dumping of large quantities of acids and alkalies, that "consideration be given" to the presence of the chemical substances listed above and to beryllium, chromium, nickel and vanadium compounds. This provision would presumably encourage Parties to exercise particular caution in allowing the disposal of those materials, which generally have a harmful potential but are not as demonstrably persistent and toxic as those in Annex I.

Finally, the controls required for dumping of Annex II materials would apply to the interim deep-dumping of mercury and cadmium compounds permitted by the interpretation set forth in the Technical Memorandum.

3. Other Dumping.—The Convention requires that all other dumping be conducted under permits or approvals from domestic authorities, that the criteria of Annex III be considered in granting such permits or approvals, and that adequate records of such dumping be kept. The Draft does not require specific permits for each dumping of materials not in Annex I or II. However, it should

encourage a systematic and rational supervision by domestic authorities over dumping activities, and should assist them in preventing excessive accumulations of ordinarily non-harmful substances which might otherwise have escaped official attention.

V. Alternative Methods of Waste Disposal

Any significant reduction in the disposal of wastes at sea will probably require the development of alternative land disposal methods, techniques for utilizing waste products, or ways of reducing the production of wastes. If acceptable techniques cannot be found the restrictions contemplated by the Convention might produce some degradation of the land environment although it is difficult to give such effects a precise quantitative expression in the abstract. Moreover, in some cases the alternative of disposing of wastes on land may prove more costly than ocean dumping although here too much will depend on the specific situation.

A detailed discussion of the technical and economic implications of the alternatives to ocean dumping may be found in Chapter III of the CEQ Report on Ocean Dumping. A National Policy and the following paragraphs summarize some of the principal statements in this regard in that report although the reader is urged to read the full text in its entirety.

The types of wastes for which alternatives to ocean dumping are outlined in the CEQ report include: solid waste, dredge spoils, sewage dredge, industrial wastes, construction and demolition debris, radioactive wastes, and explosive and chemical munitions.

Although dredge spoils and industrial wastes are the two largest sources of ocean dumping, solid waste is discussed first because the alternatives are largely applicable to the other wastes dumped in the ocean.

Solid waste.—The amount of solid waste dumped in the ocean is not yet significant, less than 1 percent of all wastes disposed of in the ocean. However, many communities are beginning to look to the ocean as a place to dispose of solid waste in light of increasing population; increasing per capita rates of solid waste generation; and the declining capacity, increasing costs, and lack of nearby land disposal sites. If many coastal cities were to dump solid waste in the ocean, many millions of tons would be introduced annually into the marine environment.

Looking at the alternatives to ocean dumping nationwide the U.S. landfill capacity is generally adequate and the average time remaining for currently used landfills in all metropolitan areas is 16 years. However, some large metropolitan areas will soon exhaust their existing sites.

Thus, in the long-term several alternatives to ocean dumping of solid waste appear indicated. New land sites must be developed. Incinerators also may have to be constructed. (By reducing the volume, possibly up to 90 percent, the cities can prolong the use of existing sites by many years.)

The CEQ report points out that the barriers to acquiring new sites are political and financial. Some communities are reluctant to be the dumping ground for the wastes of large metropolitan areas, and the transport of wastes of large distant sites increases costs. The barriers to the construction of new incinerators also are largely financial since they are expensive to build and to operate. More stringent air pollution standards will add to the capital and operating costs.

On balance, the CEQ report concludes that the additional costs for use of rail haul and land disposal instead of ocean dumping are not so high when the distances are comparable. For example, when the wastes are transported 50 or 100 miles by either method, the costs of land disposal are less than 10 percent higher.

Moreover if conducted correctly, the report concludes rail haul and land disposal offer an economically attractive method of disposing of solid waste. It also goes on to state that a stronger regional approach to waste management, better disposal operations, and adequate payment for the use of land could well overcome those barriers that exist to such methods.

One possible alternative which is extensively discussed deals with the use of abandoned strip mines. Because of the small incremental costs involved in rail haul, the report states that large coastal cities could haul their wastes to these mines economically. Moreover, adequate land for this application appears available since nationwide, surface mining has disturbed over 3.2 million acres of land. And the Department of the Interior estimates that over two-thirds of this acreage is completely unreclaimed. Thus approximately 3,300 square miles of potential solid waste disposal sites may be available and since there is ready access to almost all this land, the report concludes that "if legal

and social barriers can be removed, the problems both of providing large disposal areas and of reclaiming the land would be solved."

It also is noted that the recycling of wastes may become a general practice in time. Technology exists to recycle many types of paper, glass, aluminum, and ferrous metals, among others. Currently, 19 percent of the materials used to manufacture paper products in the United States are recycled rather than virgin materials. Eighty-five percent of all automobiles taken out of service are recycled and used in steelmaking, and tires and aluminum cans are beginning to be recycled. The problems and associated costs of separation; transportation; poor secondary markets; and other legal, economic, and social barriers have limited recycling. However, with new approaches to these barriers, new technology, and the need to conserve resources, recycling may become practical on a broad scale in the future. And as more materials are reused, disposal needs will lessen. The CEQ report concludes that it is "important to note that inexpensive but environmental unsound practices such as ocean dumping discourage waste reuse and recycling, which are desirable in the long term."

Sewage sludge may be disposed of by use as a soil conditioner or landfill, or by incineration. According to the CEQ report landbased sewage sludge disposal is more expensive than near-shore ocean disposal, but comparable to disposal of digested sludge at a distance from shore. Depending on distance, actual barge haul costs range from \$1 to \$12 per ton. Thickening, a process preparatory to barging, can add \$2 to \$6 to the cost. Digestion of the sludge can raise total ocean disposal costs by \$5 to \$18 per ton. Total ocean dumping costs can range from \$3 for undigested sludge deposited nearshore, to perhaps \$40 per ton for digested sludge dumped several hundred miles offshore. The current average is low because most communities that use the ocean for disposal dump undigested sludge nearshore.

Landfill use may disturb environmental amenities if improperly conducted; digested sludge may, however, be profitably used for fertilizer, to improve lands low in organic matter, and to reclaim strip mines. As indicated in the discussion on solid waste disposal, there seems to be sufficient land capacity in the U.S. to handle more sewage sludge. However, current land-based operations are often not adequate to protect the environment and need improvement. Pipeline disposal of treated sewage sludge for disposal at land sites is a possible alternative, but would probably increase disposal costs substantially and create environmental hazards of its own due to pipeline construction and operation.

Polluted dredge spoils may be deposited along the shoreline near the dredged area behind dikes which prevent their contamination of surrounding waters; however, diking may render shoreline areas unattractive and unusable, and may significantly increase the cost of dredging operations. High-temperature incineration or aerobic stabilization can be used to turn polluted spoils into inert ash suitable for land disposal; however, these alternatives might increase disposal costs from 4 to 24 times over ocean disposal near shore. Other types of special treatments to remove toxic materials may be feasible but have yet to be fully developed.

Disposing of all dredge spoils on land does not appear possible simply because of the vast tonnages involved. The proposed Convention, however, when coupled with the U.S. domestic ocean dumping legislation, should help assure that when such spoils are disposed of in the ocean this will be done under conditions that would protect marine life, since care will have to be taken in sampling the spoils for toxic elements, selecting suitable disposal sites and minimizing turbidity in the course of dumping.

Industrial wastes may be treated and disposed of on land, or incinerated. If improperly handled, land disposal may cause fresh water pollution, or incineration air pollution. Deep-well disposal of untreated toxic wastes may pollute ground waters. However, safe treatment techniques for most toxic industrial wastes appear feasible. In some cases, proper treatment and land disposal may be significantly more costly than ocean disposal. In the long run, changes in industrial production processes and recycling may significantly reduce waste production; such techniques are already yielding good results in modern sulfate paper plants and oil refineries.

As a general proposition and with time, it is hoped that advances in research and development and technology will reduce the problems associated with the disposal of wastes, on land. This, however, will require a continuous intensive effort by all nations concerned. Several positive steps seems to be feasible, including: a) the development of comprehensive plans for the safe

land disposal and b) the setting aside of lands which by virtue of soil characteristics, egologic substrata locations with respect to groundwater acquires economic factors, etc. might serve as safe disposal areas.

As already noted, since 1962, little or no significant quantities of radioactive wastes have been dumped at sea from United States sources. High-level wastes are now stored on an interim basis in large, well-shielded tanks, and will eventually be concentrated and stored in such geological formations as salt mines. Solid radioactive wastes have been buried in controlled landfill sites, and compaction and incineration techniques are being developed to assist this type of disposal. Deactivated reactor vessels and associated parts may be entombed in place or dismantled and buried.

Conventional munitions may be disposed by burning on land, but this process is often hazardous, noisy and pollutive. However, dismantling and salvage or mass underground burial or detonation may be practical alternatives to ocean disposal. Chemical warfare agents and munitions may be neutralized and treated or incinerated.

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VI. Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Various aspects of these relationships already have been discussed in preceding sections but several general points might be made in the form of recapitulation. First, there seems no doubt that the proposed Convention will serve to inhibit or bar the immediate, short-term use of the oceans for the dumping of some substances. As a consequence, the parties to the Convention might suffer some inconveniences or economic penalties either in processing their requests for permits from national authorities or in pursuing alternate disposal methods in cases where dumpings are proscribed. Moreover, as noted, where land disposal is the only alternative the inability to employ the oceans could result in some long-term degradation of the land environment although in some instances it could indirectly foster reclamation.

Within the U.S. there is much land that could be employed for these purposes and, in time, the penalties associated with land disposal will be reduced through advances in technology—including recycling. Also to offset those inconveniences that occur, the proposed convention should help to arrest the long-term degradation of the marine environment that would occur if indiscriminate dumping were allowed to continue both unabated and unregulated at increasing rates.

VII. Irreversible and Irretrievable Commitments of Resources Which Would Be Involved in the Proposed Action

In some instances the Convention might add, somewhat, to the financial costs of disposal and to the need to commit more resources to the development of land disposal technology. Moreover, for the reasons cited, the Convention might intensify the commitment of land areas for disposal operations. However, the Convention would still permit the disposal of wastes into the ocean under regulated conditions that would tend to preserve its long-term beneficial use.

VIII. Alternatives to the Proposed Convention

There are two major alternatives in theory to U.S. ratification of the London Convention: 2) reliance solely on the new U.S. legislation governing ocean dumping; b) possible expansion of the Convention to cover types of marine pollution not presently covered. Neither of these options is recommended as politically desirable or feasible at this time since they would place the progress achieved in carrying the Convention to its current stage in jeopardy and would appear inconsistent with the leading role that the U.S. has taken in pushing this initiative. The ability of the U.S. to induce other states to regulate their ocean dumping practices would be placed in jeopardy and future progress in this area thrown open to question.

A. Reliance on Domestic Law

As indicated, the Marine Protection Research, and Sanctuaries Act of 1972—Public Law 92-532 empowers the Federal Government to prohibit all dumping of certain materials and to designate safe disposal sites for others. This legislation was needed to control dumping in U.S. coastal waters, and will be an essential part of the fulfillment of United States responsibilities under the Convention.

However, the Act only regulates dumping in U.S. waters and the contiguous zone, and the transportation of material from the United States for dumping into the high seas. It does not, and of course could not, regulate the dumping of foreign-generated wastes by foreign ships outside of the jurisdiction of the United States. Toxic wastes might therefore continue to be dumped which could affect marine life in U.S. waters through the movement of currents or migratory species, and generally degrade the environment of the oceans, which is inextricably linked with that of our coastal waters. Furthermore, unregulated dumping by foreign industrial competitors might unfairly disadvantage American industries complying with reasonable controls over the disposal of their waste products.

Therefore, while the passage of PL-92-532 has been very desirable and should go far toward reducing the amount of U.S. wastes dumped into the oceans, it cannot replace effective international agreements to regulate dumping. Failure by the United States to support and enter into a dumping convention may well destroy its prospects, and might cause some countries to withhold participation in regional dumping arrangements for fear of suffering a competitive disadvantage from countries outside of the region.

B. Proposed Expansion of the Convention To Cover Additional Types of Pollution or Activities

Some observers undoubtedly would have preferred to have seen the Convention accord the parties greater flexibility to dump—even the materials listed in Annex I—if a careful balancing of all factors suggests that such a disposal would be more attractive economically as well as environmentally than land disposal. Others may feel, as evidenced from comments received on the earlier draft impact statement, that the London Convention accords the parties too much discretion. Moreover, still others may feel that additional sources of marine pollution should have been covered in the initial Treaty.

1. *Feasibility of Covering Additional Sources of Pollution.*—Admittedly the dumping at sea of wastes from vessels and aircraft comprises only a proportion (an estimated 10%) of the pollutive materials entering the ocean. Deliberate and accidental discharges from vessels and installations of various sorts located in the sea, effluents carried by rivers and land outfalls into the oceans, and fallout from land-generated atmospheric pollution account for the vast preponderance of marine pollution. The United States therefore might have proposed expansion of the Convention to deal with discharges from one or more of these sources.

The Convention, for example, applies to “any deliberate disposal at sea of matter from vessels or aircraft, including matter transported to fixed or floating

platforms at sea for deliberate disposal." It applies to the deliberate disposal of vessels, aircraft and platforms as well, but does not apply to the placement of matter for a purpose other than disposal, or to disposal, "incident to or derived from the operation of vessels or aircraft and their equipment, other than the cargo of vessels or aircraft operating for the purpose of disposal of matter or the products derived from the treatment of such cargo on board . . ."

The Convention would therefore not affect such operational procedures as tank washings and bilge pumpings, which do in fact cause significant quantities of oily residues and other potentially noxious substances to be discharged into the oceans each year. The regulation of these discharges is, however, being actively pursued by the Intergovernmental Maritime Consultative Organization (IMCO) in its preparations for a proposed 1973 Conference designed to reach agreement to minimize or eliminate such discharges. The effective control of these discharges requires detailed regulation of vessel construction and operating procedures, and any attempt by the Ocean Dumping Conference to handle such problems only would have duplicated the intensive work of the IMCO and could have delayed substantially the satisfactory conclusion of the London Conference, including the development of a broadly acceptable convention.

In addition, the preliminary working groups for the 1973 United Nations Law of the Sea Conference are developing international controls over ocean platforms, installations and equipment engaged in the uses and exploitation of the Seabed. Any attempt by the recent Ocean Dumping Conference therefore to have pre-empted the work of these United Nations bodies would have been counter-productive and would only have delayed the conclusion of a dumping agreement while the complex technical and legal aspects of regulation of these activities were worked out.

It also must be noted that under Article XII of the Convention, the Parties have committed themselves to protect the marine environment against pollution caused by a number of activities other than ocean dumping. International controls over land discharges into the atmosphere, into rivers or directly into the sea should be pursued, and in the long run may be necessary to make possible the survival of the marine ecosystem. However, establishing such controls will require a long process of developing international technical machinery and institutions, resolving legal questions regarding international regulation of domestic activities, and achieving broad political acceptance. Therefore, the introduction of these aspects of the marine pollution problem into the London Conference only would have postponed indefinitely international controls over ocean dumping.

2. *National Discretion in Granting Dumping Permits.*—The Convention allows considerable latitude to the domestic authorities of the Parties in granting permits or approvals for the dumping of various materials. The dumping of Annex II materials is left to the discretion of each Party, subject to the requirements that the criteria of Annex III be considered and that no dumping be permitted of material determined by that Party to be as deleterious as Annex I materials. More control might be provided by the transfer of particular Annex II substances to Annex I; by the empowering of some international body such as the IMCO or GESAMP to monitor national dumping and to issue recommendations whenever the continued dumping of particular substances in particular areas appears hazardous; or by the adoption of detailed restrictions on the location, water depth, containerization, concentration, and the like, of the dumping of particular Annex II materials. Each of these approaches would meet with strong resistance from industrialized countries concerned with preserving a reasonable of flexibility for their domestic authorities in weighing the alternatives to ocean disposal in each case with the environmental hazards of dumping at sea; indeed it is doubtful whether the U.S. itself could have tolerated greater restraints on its flexibility. Accordingly, it is believed that the subject Convention strikes a reasonable balance between the need to move to a prudently regulated international machinery and the need to provide states with a degree of discretion in balancing, on a case by case basis, the benefits of sea in contrast to land disposal.

3. *Vessels and Aircraft Covered.*—The Convention includes all waterborne and airborne craft, but does not apply to vessels and aircraft "entitled to sovereign immunity under international law;" each Party does, however, pledge to "ensure by the adoption of appropriate measures that such vessels and aircraft owned or operated by it act in a manner consistent with the object and purpose of this Convention . . ." This exception exempts military craft and certain other craft in government noncommercial service, and instead leaves their dumping activities within the control of their flag state, subject to the general duty not to contra-

vene the purposes of the Convention. This raises the question of whether the Convention should have been expanded to apply to such vessels. During the London Conference the United States indicated that it required an explicit military exemption clause and others agreed to this position. Indeed, it is questionable whether the Convention could have obtained the requisite endorsement of the major powers, without such an exemption. It was the U.S. view, which others shared, that subjecting the operations of military and related craft to international regulation would be inconsistent with the operational freedom necessary to permit such vessels to carry out their missions. We also felt coverage of military vessels would represent an undesirable precedent from the standpoint of U.S. national security interests. Accordingly, an amendment of the Convention to now permit the coverage of U.S. military vessels would be contrary to the stated U.S. position.

Moreover, the exemption is not expected to weaken the Convention's effect when one recognizes that each party is required to operate such excluded vessels and aircraft in a manner consistent with the Convention's purpose.

IX. General Conclusions

Overall and assuming broad adherence, the Convention would severely restrict the dumping of toxic substances into the marine environment and establish a worldwide consciousness, that dumpings of all sorts should be a matter of governmental concern and regulation. This should have a salutary effect on states that are not parties to the Treaty as well as those that are.

Moreover, as noted, the Convention places great stress on the need of the parties to "harmonize" their practices. Apart from minimizing adverse environmental effects, such harmonization should serve to equalize the economic costs that each nation will have to bear in complying with the provisions. The U.S. recently enacted legislation, for the first time, regulating its own ocean dumping activities. Thus, the proposed Convention should tend to assure that a number of other countries abide by comparable practices.

It is recognized that the regulation of ocean dumping offers at best the management of approximately 10% of the pollutants entering the world's ocean. This Convention is, however, viewed as a first step in the direction of international management of a common global resource.

DRAFT ENVIRONMENTAL IMPACT STATEMENT—PROPOSED BILL TO IMPLEMENT THE INTERNATIONAL CONVENTION RELATING TO INTERVENTION ON THE HIGH SEAS IN CASES OF OIL POLLUTION CASUALTIES, 1969

I. BACKGROUND

In 1967 the *Torrey Canyon* was the thirteenth largest ship afloat. She was registered in Liberia, owned by a Bermuda-based subsidiary of the Union Oil Company, chartered by British Petroleum and operated by an Italian crew.

On March 18, 1967 the *Torrey Canyon* ran aground in international waters off the coast of England. About half of the vessel's cargo or 60,000 tons of crude oil were released into the Atlantic causing oil pollution damage of several millions of dollars in England and France. The remainder of the cargo was either destroyed as a result of actions taken by the British Government or remained within the wreck.

Substantial legal questions arose as a result of the accident. Since the ship was in international waters, it was not clear under international law whether the British Government had the right to act against the ship to prevent, mitigate, or eliminate pollution damage. The Government did take action against the ship but only after ten days of delay because of legal uncertainty.

As a result of the accident, the Intergovernmental Maritime Consultative Organization, (IMCO), a United Nations Specialized Agency with headquarters in London, intensified deliberations on the problems of oil pollution. Subsequently, the IMCO Legal Committee drafted two conventions. The first, the International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties, concerns the right of a coastal state to take action against a vessel in order to prevent oil pollution and the right of the vessel owner to receive compensation for unjustified action. The second, the International Convention on Civil Liability for Oil Pollution Damage, establishes the liability

of the owner of the vessel to governments and private parties for the damage caused by oil pollution.

Article I of the Convention relating to Intervention on the High Seas establishes a coastal nation's right to "take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty or acts related to such a casualty". A "grave and imminent danger", while defined in neither the bill, nor the Convention can be interpreted to mean a serious threat which may reasonably be expected to result in major harmful consequences. The Convention does not authorize measures against any warship or other ship owned or operated by a State and used, for the time being, only on government non-commercial service. Article III lists various requirements, including notification of the other parties involved, relating to the measures permitted by Article I. Article V stipulates that measures taken "shall be proportionate to the damage actual or threatened * * *" and Article VI provides for compensation to be paid "to the extent of the damage caused by measures which exceed those reasonably necessary to achieve the end mentioned in Article I."

II. DESCRIPTION OF THE PROPOSED ACTION

A. Proposal and Objectives

The proposed bill, the Intervention on the High Seas Act (S. 1070), would implement the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969, which was approved by the Senate on September 20, 1971. The Convention permits a coastal nation to take whatever action may be necessary to prevent, mitigate, or eliminate a threat of oil pollution resulting from a maritime accident on the high seas. Under Section 311(d) of the Federal Water Pollution Control Act, the government can take appropriate action to remove or eliminate a threat of an oil discharge when the vessel is within the navigable waters of the United States.

When a maritime accident occurs outside U.S. territorial waters, the bill would give the Secretary of the department in which the Coast Guard operates, the authority to take appropriate action against United States and foreign vessels when there exists a grave and imminent danger to the coastline or related interests of the United States from pollution or threat of pollution of the sea by oil discharge which may reasonably be expected to result in major harmful consequences. That authority is subject to reasonable safeguards under the proposed bill. The objective of this bill is to reduce one source of the pollution of United States waters by oil.

B. Major features of the bill

Whenever a ship collision, stranding, or other incident of navigation, or other occurrence onboard a ship or external to it resulting in material damage or imminent threat of material damage to the ship or her cargo creates, as determined by the Secretary, a grave and imminent danger to the coastline or related interests of the United States from pollution or threat of pollution of the sea by oil which may reasonably be expected to result in major harmful consequences, the Secretary may, with certain exceptions, without liability for any damage to the owner or operator of the ship, to her cargo or crew, or to underwriters or other interested parties, take measures on the high seas, in accordance with the provisions of the Convention and this bill, to prevent, mitigate, or eliminate that danger.

Ship, as defined by the bill means any seagoing vessel of any type whatsoever, and any floating craft, except an installation or device engaged in the exploration and exploitation of the resources of the seabed and the ocean floor and subsoil.

In determining whether there is a grave and imminent danger of major harmful consequences to the coastline or related interests of the United States, the Secretary must consider the interests of the United States directly threatened or affected, including, but not limited to, fish, shellfish and other living marine resources, wildlife, coastal zone and estuarine activities, and public and private shorelines and beaches.

Upon such a determination, the Secretary may (1) coordinate and direct all public and private efforts directed at the removal or elimination of the threatened pollution damage; (2) directly or indirectly undertake the whole or any part of any salvage or other authorized action; and (3) remove, and, if necessary, destroy the ship and cargo which is the source of the danger.

Before taking these measures, the Secretary shall (1) consult, through the Secretary of State, with other countries affected by the marine casualty, and particularly with the flag country of any ship involved; (2) notify without delay the Administrator of the Environmental Protection Agency and any other persons known to the Secretary, or of whom he later becomes aware, who have interests which can reasonably be expected to be affected by any personal measures; and (3) consider any views submitted in response to such consultation or notification. In cases of extreme urgency requiring measures to be taken immediately, the Secretary may take those measures rendered necessary by the urgency of the situation without prior consultation or notification or without the continuation of consultations already begun. The measures taken must be proportionate to the damage, actual or threatened, to the coastline or related interests of the United States.

The United States will pay compensation to the extent of damage caused by measures which exceed those reasonably necessary to achieve the purpose of the Convention.

The Secretary shall use his best endeavors to (1) assure the avoidance of risk to human life; (2) render all possible aid to distressed persons; and (3) not unnecessarily interfere with the rights and interests of others.

No measures may be taken under the authority of this bill against any warship or other ship owned or operated by a country and used, for the time being, only on government non-commercial services.

The revolving fund established under section 311(k) of the Federal Water Pollution Control Act will be available for financing Federal actions and activities under this bill. At this time the fund is available for removal of oil in the navigable waters and contiguous zone of the United States and for actions taken pursuant to Section 311(d). Any person who willfully violates a provision of the proposed bill or a regulation issued thereunder shall be fined not more than \$10,000 or imprisoned for not more than one year, or both.

III. EFFECTS OF MARINE OIL POLLUTION

Although the total and long-term effects of marine oil pollution are not yet fully known, it is clear that oil pollution represents a serious threat to the marine and coastal environment.

Oil slicks represent a serious danger to seabirds. The coating of feathers with oil may cause the breakdown of feather structure which would, in turn, result in loss of insulating and waterproofing capabilities. Death from heat loss and by starvation could easily result. Death could also occur from ingestion of toxic substances in the oil as the bird preens its feathers [1]. Further reductions of bird populations could result from destruction of breeding, moulting, migration or wintering areas [2]. Major discharges of oil result in the immediate deaths of thousands of seabirds, in some cases estimates of bird fatalities from single spills have exceeded 100,000 [3]. Deaths resulting from indirect causes such as contaminated food may also result in substantial bird losses.

Fish and shellfish are also affected by discharged oil. Ingestion of toxic hydrocarbons contained in oil by these organisms can cause death. Oil coating of the epithelial tissue can also be fatal. Bottom-dwelling organisms are especially threatened by oil pollution. Most toxic hydrocarbons appear to persist and cause severe damage on the sea bottom long after surface slicks have settled or dispersed. This persistence may destroy the bottom-dwelling organisms which in turn may reduce fish populations which depend on them for food. The loss of these bottom organisms, which help hold the sand together, could also result in erosion of the sea bottom.

Many organisms are indirectly affected by oil pollution. The flesh of fish and shellfish becomes tainted with oil which renders it unfit for human consumption. The oil may not be sufficient to cause death but it can severely stress the organism. This stress can result in poor reproductive performance, lower resistance to other stresses and reduced ability to obtain food.

The estuarine tidal marsh is one of the most productive ecosystems [4]. Pollution of our estuaries cannot only reduce the normal populations there, but can also interfere with the breeding cycles of many marine species that frequent the area [5]. Algae, planktonic life and other marine organisms in the estuary are important sources of food. The ecological balance of a marine area may be altered due to changes in the composition of these organisms. Sedentary forms of marine life are specially hard hit because of their inability to escape exposure to the oil.

The secondary effects of oil pollution are also very important. Animals that migrate into the area even after the initial contamination has disappeared can be affected by the oil. Residual oil in plants and animals consumed by these animals can be very harmful. Biological concentration, the concentrating of a substance as it is passed up the food chain, can affect animals that are related to the contaminated area only through the food chain. Studies have found that hydrocarbons, once incorporated into a particular marine organism, are stable and may pass through many members of the marine food chain without alteration [6]. Marine mammals are also affected by oil pollution. Furred seals and otters lose critical insulation and buoyancy when oil coats their fur. All marine mammals are affected by the destruction of their food sources due to oil pollution damage.

Some ecologists have speculated that oil discharges into the oceans may ultimately affect human health through the possible buildup of toxic and carcinogenic substances due to biological concentration in fish and shellfish [6]. This occurs when the contaminated flesh is eaten by a human or other high life form.

Oil pollution is a serious threat to the beauty and usefulness of coastal areas. Serious property damage and interference with commercial and recreational activities could occur if oil from a distressed vessel reaches the shoreline. Esthetic damage to the coastline due to oil contamination causes a reduction of the recreational value of the area. This can cause a severe economic loss to the tourism business in the area. Many accidents have occurred, one being the Torrey Canyon disaster, which resulted in widespread damage to the esthetic, economic and recreational areas of the English and French coastlines. \$16 million worth of property damage claims were submitted, \$7.5 million of which were settled.

IV. ENVIRONMENTAL IMPACT OF THE BILL

The quantity of oil being shipped by tank vessels has increased rapidly and this rapid increase is expected to continue. In 1971, 1.5 million tons of petroleum products were shipped, 600 million tons of which were commerce of the United States [7]. In 1980 the United States oil consumption over the 1970 figure is expected to increase by forty percent [8]. Studies of oil discharges in 1969-1970 due to vessel casualties show that 70 percent of all oil discharges occur outside of harbor areas [9]. During this study, Keith and Porricelli determined that 215,000 tons of oil enter the sea per year due to tanker casualties. This oil affects the entire marine ecosystem. If the United States can intervene in cases of marine casualty where oil threatens our coastline, some of the oil could be prevented from entering the marine environment. The proposed bill will help to reduce the quantity of oil discharged into the marine environment.

The overall increase in petroleum imports, combined with the shift in sources of supply, dictate a large increase in the tanker capacity necessary to meet the United States 1980 energy requirements. The Maritime Administration projects that 320 tankers, working full time, will be required to carry the 1980 U. S. petroleum trade. This is an increase of 108 ships over the 1971 fleet of 212 [10]. In 1972 the U. S. Coast Guard reported nine oil discharging casualties in the contiguous zone and high seas off the United States coasts. This is in contrast to 1971 figures where only one such discharge occurred. The number of casualties per vessel is not an accurate figure for predicting the number of discharges per year. The increased amount of tanker traffic in the future will increase the probability of casualty discharges. The provisions of this bill would be applicable in many of these cases.

Neither the convention nor the bill directly regulates the carriage of oil at sea or the safety and construction standards of tankers and other vessels. These are covered by other laws and conventions. Neither is meant to take the place of comprehensive and effective international controls over activities likely to cause marine oil pollution. However, the bill has the potential to reduce oil pollution of United States coastlines by enabling the United States to take whatever action it deems necessary to prevent, mitigate, or eliminate a threat of oil pollution resulting from a maritime accident on the high seas.

With the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, there will be no question whether the government has the authority to act. The proposed bill will delegate the authority to The Secretary of the department in which the Coast Guard is operating. This authority will permit a speedy response which is often necessary to eliminate or reduce pollution. The money for this action will come from the revolving fund, established by the Federal Water Pollution Control Act. The existence of legal

authority and the accessibility to the revolving fund will enable the government to act to reduce or eliminate a discharge or the threat of a discharge which would result in major harmful consequences to the coastline or other related interests of the United States.

The elimination of oil pollution caused by vessel casualties will be beneficial to the sensitive near-shore areas, such as estuaries, intertidal zones, etc. The ability of the government to act to prevent or minimize a discharge will protect the sensitive coastal area. Early action could be taken to protect the shoreline. This added time could be used to reduce the environmental impact (1) diverting, if possible, the discharged oil to an area, if available, less sensitive to oil damage; (2) allowing time to clean up the oil before it reaches the shore; (3) allowing time to prepare the coastline to minimize the oil's impact; (4) removing the source of the discharge from the area, i.e. towing the ship out to sea; and (5) removing the potential for a discharge by unloading the cargo, supplying the vessel with needed assistance, etc. This bill will enable the government to take these and other actions to reduce or eliminate oil damage to the coast or other related interests of the United States.

V. ADVERSE ENVIRONMENTAL EFFECTS

The basic concept of the bill is to reduce oil pollution damage to the coastlines or related interests of the United States. Once a discharge occurs on the high seas, the bill enables the United States to act to remove the discharge with reimbursement for this action available through the revolving fund. The bill also authorizes action before the discharge occurs if a grave and imminent danger to the coastline or other related interests exists. The action taken to reduce or eliminate this threat or remove the oil can have adverse environmental effects. However, the adverse effect of the discharge is usually greater than the effects of the prevention measures.

A. Adverse Environmental Impact of Action Taken at the Source

The action taken by the United States to reduce or mitigate the effects of the discharge on our coastal environment could have an adverse environmental impact. Actions taken against the ship to eliminate the threat of pollution may affect the marine environment. This action may prevent the discharge from reaching the coastline but the oil's presence will affect the immediate area of the accident. This action, if not executed properly, may introduce more oil, more rapidly than would otherwise occur. Salvage or removal efforts involving demolition may destroy marine life in the immediate area. The diversion of the discharged oil to an area of lesser ecological sensitivity, i.e., the open ocean, will affect that area's environment. Pelagic plants and animals in the open ocean will be affected by this oil. Oil entering the food chain could effect the ecology of the entire ocean.

B. Adverse Effects of the Removal of Oil

The biological effects of control and removal procedures following a discharge are an essential part of the environmental impact assessment. Sorbents, material that absorb oil can be used to collect oil. Problems with disposal of this material sometimes cause adverse environmental impact. Chemicals and substances used to disperse, concentrate, burn, sink or otherwise remove oil are also used. The use of these chemicals in United States waters is subject to the approval of the Environmental Protection Agency. The environmental impact of these substances is not fully understood but often they cause adverse environmental effects. Once the oil is collected, disposal is a problem. If the oil is not disposed of properly, re-entry into the marine environment through leeching often occurs. The daily quantity may be small but studies show that chronic oil pollution is harmful to the ecosystem which it enters [6].

VI. SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The proposed bill would have positive short-term and long-term environmental benefits. In the short run it would provide the United States with the authority to take necessary action to reduce the threat of pollution to its shores in cases of ship accidents on the high seas. This bill is a benefit to long-term productivity by reducing one source of oil pollution in critical environmental areas, i.e., coastal waters.

VII. ALTERNATIVES

Once the Convention is ratified and comes into force, the United States government will have the legal authority established by the Convention. If ratification fails, the government will not have the legal authority to act against foreign vessels in international waters.

A. Alternatives if the convention is ratified

1. Should no action be taken on this or any other bill to implement the Convention, the U.S. would nevertheless, upon ratification and entry into force of the Convention, have the internationally recognized right to act pursuant to its provisions. There would, however, be no legislative direction as to the proper administering agency and no authorization for the necessary funding. The inconsistency of ratification without implementation is readily apparent.

2. The proposed bill could be changed to include strict limitations on when action could be taken. The bill would specify what conditions should exist before action could be taken. This would reduce the possibility of inappropriate actions that could lead to an increased discharge. Because of the varied nature of each individual casualty, these limitations would be extremely difficult to define.

3. The proposed bill could be changed to include specific limitations as to the actions that could be taken to prevent or reduce a threat of oil pollution damage. A study would be necessary to determine what types of action are appropriate for each specific situation. Because of the large number of variables in each situation, the determination of "appropriate action" for each case would be very difficult.

B. Alternatives if the convention is not ratified

1. Prevention or reduction of pollution of the coast by a source outside the territorial seas could be accomplished by developing rapid action plans and removal methods to control the oil before it reaches the coast. At this time, it is not feasible or possible to control oil at sea in most instances. This creates difficulty in preventing oil from reaching the shore. At the water-land interface, oil pollution causes substantial environmental damage because of the high density of organisms in the area. The base of the food chain for fish and shellfish originates in the estuaries [5]. Removal at the shoreline is costly and ecologically damaging to the area. Prevention of the discharge would clearly be a better alternative than removal of the oil in territorial waters, or when it reaches the shore.

2. New legislation might be adopted that would extend the government's right to act in cases of a threat of oil pollution of the coastline by a specific number of miles out at sea. This would limit the government's ability to act in all cases where a grave threat of oil pollution is present. The specific distance from the coast that would be internationally acceptable would be in the limiting factor. Forty-three percent of all oil discharges occur within 50 miles of the coast [9]. Regardless of where an incident occurs, the oil may reach the shore. Action at the earliest possible moment will allow time to reduce the effects of the discharge.

VIII. IRREVERSIBLE RESOURCE COMMITMENTS

The proposed legislation would not involve any irreversible or irretrievable commitment of natural resources.

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- (1) Clark, R. B., "Oil Pollution and the Conservation of Seabirds", Oil Pollution of the Sea, Rome, 1968
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- (7) National Summaries, Waterborne Commerce of the United States Pt. 5,
- (8) Dupree, Walter G. Jr., and West, James A., United States Energy Through the Year 2000, Department of the Interior, 1972
- (9) Keith, V. F. and Porricelli, J. D., "An Analysis of Oil Outflow Due to Tanker Accidents", Prevention and Control of Oil Spills, 1973
- (10) Maritime Administration Tanker Construction Program, U.S. Department of Commerce Report No. EIS 730392D, 1973

DEPARTMENT OF TRANSPORTATION, U.S. COAST GUARD, MARINE ENVIRONMENTAL PROTECTION DIVISION, APRIL 1973; FINAL ENVIRONMENTAL IMPACT STATEMENT—AMENDMENT OF THE OIL POLLUTION ACT, 1961 (75 STAT. 402), AS AMENDED, BY IMPLEMENTATION OF THE 1969 AND 1971 AMENDMENTS TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF THE POLLUTION OF THE SEA BY OIL, 1954, AS AMENDED

SUMMARY SHEET

() Draft (X) Final Environmental Impact Statement

Responsible Federal Agency—

U.S. Coast Guard—Marine Environmental Protection Division

1. *Name of action.*—Legislative action.

2. *Description.*—A bill to amend the Oil Pollution Act, 1961, as amended, by implementation of the 1969 and 1971 Amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended.

3. *Environmental Impact and Adverse Environmental Effects.*—The bill establishes rigid control measures to prevent and control pollution of the sea by oil. Enactment of this bill will cause a substantial reduction in the quantity of oil being discharged at sea. There are no adverse environmental effects resulting from enactment of this bill.

4. *Alternatives Considered.*—

a. No legislation

b. Stronger legislation

5. *Federal agencies receiving copies of draft statement for comment.*—

a. Department of Commerce—National Oceanic and Atmospheric Administration, Maritime Administration

b. Department of Transportation—Office of Environmental Quality

c. Environmental Protection Agency—Office of Water Quality, Office of Federal Activities

d. Department of Defense—Army Corps of Engineers, Department of the Navy, Office of the Oceanographer of the Navy

e. Department of the Interior—Bureau of Sports Fisheries and Wildlife, Bureau of Land Management

6. *Date draft/final statement made available to Council of Environmental Quality and public.*—

Draft Statement—September 22, 1972.

Final Statement—April 1973.

1. DESCRIPTION OF PROPOSED ACTION

This bill amends the Oil Pollution Act of 1961 (75 Stat. 402), as amended, by implementing the 1969 and 1971 amendments to the International Convention for the Prevention of Pollution of the Sea by Oil of 1954, as amended, and is applicable only to ships of American registry or nationality. However, the same provisions will apply to ships of other registry as the amended International Convention is implemented by the governments signatory thereto. Violations by foreign vessels will be noted and forwarded through appropriate channels to the government concerned for legal action.

Existing Discharge Controls

The Oil Pollution Act of 1961, as amended, established certain prohibited zones within which discharges of oil or oily mixtures with an oil content greater than one hundred parts per million (ppm) are prohibited by tankers over one hundred and fifty gross tons. It also prohibits these same discharges by ships other than tankers, over 500 tons in gross tonnage, within any of the prohibited

zones, except when the ship is proceeding to a port not provided with adequate facilities for the reception of these oily mixtures, without causing undue delay.¹ Such discharges are to be made as far as practicable from land. The prohibited zones as established are defined as all areas within fifty miles from the nearest land, subject to extensions effectuated in accordance with the terms of the Convention and published in 33 C.F.R. 151. Ships of twenty thousand gross tons or more, built after the effective date of this Act, are prohibited from discharging oil or an oily mixture anywhere in the oceans except when in the opinion of the master, special circumstances make it neither reasonable nor practicable to retain the oil or oily mixture on board. In this situation, a discharge is permitted outside of a prohibited zone. Discharges prohibited by the Convention do not apply when a discharge is made for the purpose of securing the safety of the ship, preventing damage to a ship or cargo, or saving life at sea, nor do the prohibitions apply to the escape of oil or oily mixture resulting from damage to a ship or unavoidable leakage, nor to the discharge of residue arising from the purification or clarification of fuel oil or lubricating oil provided such discharge is made as far from land as practicable. The prohibitions also do not apply to the discharges from the bilges of a ship of an oily mixture containing no oil other than lubricating oil which has drained or leaked from machinery spaces.

Present Oil Record Book Requirements

The Act also requires every ship using oil fuel and every tanker to carry an oil record book on board. This book shall have entries whenever any of the following operations takes place in the ship:

- (1) Ballasting of and discharge of ballast from cargo tanks of tankers;
- (2) Cleaning of cargo tanks of tankers;
- (3) Settling in slop tanks and discharge of water from tankers;
- (4) Disposal from tankers of oily residues from slop tanks or other sources;
- (5) Ballasting, or cleaning during voyage, of bunker fuel tanks of ships other than tankers;
- (6) Disposal from ships other than tankers of oily residues from bunker fuel tanks or other sources;
- (7) Accidental or other exceptional discharges or escapes of oil from tankers or ships other than tankers.

Present Penalties

The Act provides for criminal and civil penalties for violation of any provision of the Act. Maximum penalties are \$2500 (and no less than \$500) or imprisonment not exceeding one year, or both a fine and imprisonment for each offense. Failure to comply with Article VII of the Convention, which concerns the prevention of the escape of fuel oil or heavy diesel oil into vessel bilges, shall result in a civil penalty not in excess of \$100. Failure to comply with the requirements for maintaining an oil record book shall result in a liability upon conviction for a fine not exceeding \$1000 nor less than \$500. Falsification of entries in an oil record book shall result in a liability upon conviction for a fine not exceeding \$1000 nor less than \$500 or imprisonment for a term not exceeding six months, or both.

Proposed Discharge Controls

The bill amends the 1961 Act by implementing the 1969 and 1971 Amendments to the 1954 International Convention. The 1969 Amendments were approved by the Senate on 20 September 1971. The 1971 Amendments were transmitted to the Senate on 5 May 1972 and are awaiting action.

The 1969 Amendment imposes more stringent constraints than the present International Convention on oil and oily mixture discharges from vessels any-

¹ The tonnage criteria for tankers and ships other than tankers, as specified in the Act, are based on the figures from the Convention. For tankers, only .468 percent of the total world gross tonnage, and .0908 percent of the total U.S. gross tonnage consist of vessels under 500 tons. For ships other than tankers, only 2.61 percent of the total world gross tonnage, and 2.08 percent of the total U.S. gross tonnage consist of vessels under 500 tons (Lloyd's Register of Shipping Statistical Tables, 1971). These figures indicate that only an insignificant introduction of oil into the oceans is made by tankers under 150 gross tons and ships other than tankers under 500 tons. Additionally, tankers under 150 gross tons generally do not travel in the open sea and do not ballast their tanks after unloading their cargo. Also, these tankers usually carry oil products and are less apt to ballast their empty tanks because it is uneconomical. By considering these factors on top of the fact that vessels under 150 gross tons make up an extremely small percentage of the total gross tonnage of tankers in operation (either worldwide or in the U.S.), the amount of oil or oily mixture discharged by these vessels is a minute fraction of the total amount being discharged by all tankers.

where. This amendment eliminates the prohibited zone concept, which discourages but does not prohibit indiscriminate discharge in the open sea beyond the established prohibited zones (generally within 50 miles of land). Under the 1969 amendment and the proposed legislation, discharges of oil or oily mixtures from ships to which the present International Convention applies, other than tankers, will be prohibited unless:

- (1) The tanker is proceeding en route; and
- (2) The instantaneous rate of discharge of oil content does not exceed 60 litres per mile; and
- (3) The oil content of the discharge is less than 100 parts per 1,000,000 parts (ppm) of the mixture; and

(4) The ship is as far as practicable from land.

For tankers, all discharges are prohibited unless:

- (1) The tanker is proceeding en route; and
- (2) The instantaneous rate of discharge of oil content does not exceed 60 litres per mile; and
- (3) The total quantity of oil discharged on a ballast voyage does not exceed 1/15,000 of the total cargo-carrying capacity; and
- (4) The tanker is more than 50 miles from the nearest land.

Under this proposed legislation, instantaneous rate of discharge of oil content is defined as the rate of discharge of oil in litres per hour at any instant divided by the speed of the ship in knots at the same instant. Also, oily mixture is redefined as a mixture with any oil content rather than the present definition which requires over 100 ppm to qualify as an oily mixture.

Proposed Oil Record Book

Entries in the oil record book of a vessel shall be made on each occasion, on a tank-to-tank basis, whenever any of the following takes place in the ship:

- (1) For tankers—
 - (a) Loading of oil cargo;
 - (b) Transfer of oil cargo during voyage;
 - (c) Discharge of oil cargo;
 - (d) Ballasting of cargo tanks;
 - (e) Cleaning of cargo tanks;
 - (f) Discharge of dirty ballast;
 - (g) Discharge of water from slop tanks;
 - (h) Disposal of residues;
 - (i) Discharge overboard of bilge water containing oil which has accumulated in machinery spaces while in port, and the routine discharge at sea of bilge water containing oil unless the latter has been entered in the appropriate log book.
- (2) For ships other than tankers—
 - (a) Ballasting or cleaning of bunker fuel tanks;
 - (b) Discharge of dirty ballast or cleaning water from bunker fuel tanks;
 - (c) Disposal of residues;
 - (d) Discharge overboard of bilge water containing oil which has accumulated in machinery spaces while in port, and the en route discharge at sea of bilge water containing oil unless the latter has been entered in the appropriate log book.

Proposed Great Barrier Reef Controls

Under one of the 1971 amendments, the Great Barrier Reef of Australia is considered equivalent to a land area thereby precluding discharges of oil and oily mixture in proximity of the shelf.

Proposed Tank Size/Arrangement Limitation

The other 1971 amendment to the International Convention deals with tank arrangements and limitations of tank size for new tank vessels. Under the provisions of this portion of the bill, every tanker to which this Act applies and built in the U.S. and for which the building contract is placed on or after the effective date of this section shall be constructed in accordance with the provisions of Annex C to the Convention relating to tank arrangement and limitation of tank size. Every tanker to which this proposed Act applies and built in the United States and for which the building contract is placed or the keel is laid or is in a similar state of construction, before the effective date of this section, shall, within two years after that date, comply with the provisions of Annex C to the Convention if the delivery of the tanker is after 1 January 1977; or if the delivery of the tanker is not later than 1 January 1977 and the building

contract is placed after 1 January 1972, or in cases where no building contract has been previously placed, if the keel is laid or the tanker is at a similar state of construction, after 30 June 1972. Tankers constructed under the provisions of this section shall carry on board a certificate, issued by the Secretary of the Department in which the Coast Guard is operating, attesting to that compliance. Tankers not required to be constructed in accordance with these provisions shall carry on board a certificate to that effect issued by the Secretary. Tankers of U.S. nationality are prohibited from engaging in domestic or foreign trade without an appropriate certificate. Certificates issued to foreign tankers pursuant to the Convention by other nations shall be accepted by the Secretary as of the same force as certificates issued by him. If the Secretary is satisfied that a tanker does not comply with the provisions of the Convention, whether or not the nation the vessel is registered in is signatory to the Convention, he may deny this tanker access to U.S. ports or off-shore terminals under U.S. control or the territorial seas of the United States.

Proposed Penalties

The proposed amendment will provide much stronger penalties than the existing law. Any person who willfully discharges oil or oily mixture from a ship in violation of the 1961 Act as amended by this bill or the regulations thereunder shall be fined not more than \$10,000 for each violation or imprisoned not more than one year, or both. In addition to any other penalty prescribed by law, any person who willfully or negligently discharges oil or oily mixture from a ship in violation of the 1961 Act as amended by this bill or any regulation thereunder shall be liable to a civil penalty of not more than \$10,000 for each violation, and any person who otherwise violates this Act or any regulation thereunder shall be liable to a civil penalty of not more than \$5,000 for each violation.

Nothing in the Act, as amended by this bill, or in regulations issued hereunder shall be construed to modify or amend the provisions of section 311 of the Federal Water Pollution Control Act, as amended, or of section 89 of Title 14.

PROBABLE IMPACT OF PROPOSED ACTION

This bill addresses itself to (1) intentional discharges, the single largest source of oil pollution from marine operations, and (2) limiting the extent of the release of oil during certain casualty situations.

Oil Pollution Sources

The sources and magnitudes of all oil pollution in the seas provide the general background for evaluating the impact of tankers on the environment. Dr. Max Blumer of the Woods Hole Oceanographic Institution has estimated that "the total annual influx to the ocean lies probably between five and ten million tons." Other sources have placed this influx figure from as low as 1.64 million tons to as high as 5 million tons.^{1 2}

The results of analysis of statistical data, extrapolations, and casualties that relate to oil in the ocean are given in tables 1 and 2. During calendar years 1969 and 1970, the average annual amount of oil pollution of the oceans from all sources was estimated at 4.897 million metric tons. Of this amount, 2.307 million metric tons or 47.1 percent of the oil was from vessels (including barges) or vessel-related operations. Tankers (including tank barges) and tanker-related operations account for 1.457 million metric tons (29.8 percent) of the annual oil influx.

¹ "Man's Impact on the Global Environment—Report of the Study of Critical Environmental Properties," Cambridge, Massachusetts, 1970.

² T. A. Murphy, "Environmental Effects of Oil Pollution," paper presented to the American Society of Civil Engineers, Boston, Massachusetts, July 1970.

The derivation of the figures given in table 1 is explained by Porricelli, Keith, and Storch³ on a topic-by-topic basis. The following paragraphs summarize the information that pertains specifically to tankers and tank barges.

Tankers and tank barges contribute to the oil pollution of the marine environment in four main ways:

- (1) Routine tank cleaning operations;
- (2) Vessel casualties;
- (3) Discharges from bilge pumping and leaking; and
- (4) Spills during cargo handling operations.

A more comprehensive picture of the oil pollution associated with tankers is depicted in figure 1. The relative magnitude of the four major categories is shown on table 3.

Intentional (routine) Discharges

Of the 1.46 million metric tons of oil loss per year for which tankers (including tank barges) are accountable (table 1), 967,000 metric tons come from routine ballasting and cleaning of cargo oil tanks. The following description of these operations explains their purpose and the procedures involved. It should be noted in advance that the oily ballast or oil residue involved in these operations can be held on board ship and discharged into a ballast reception facility on shore at the loading port if such a facility is available.

TABLE 1.—ESTIMATED ANNUAL OIL POLLUTION OF THE OCEANS

	Metric tons	Percent
Marine operations:		
Tankers:		
LOT (load-on-top) tank cleaning operations.....	265,000	5.42
Non-LOT tank cleaning operations.....	702,000	14.31
Discharge due to bilge pumping, leaks and bunkering spills.....	100,000	2.01
Vessel casualties.....	250,000	5.14
Terminal operations.....	70,000	1.44
Tank barges:		
Discharge due to leaks.....	20,000	.41
Barge casualties.....	32,000	.65
Terminal operations.....	18,000	.38
All other vessels:		
Discharge due to bilge pumping, leaks and bunkering spills.....	600,000	12.25
Vessel casualties.....	250,000	5.11
Offshore operations.....	100,000	2.04
Nonmarine operations:		
Refineries and petrochemical plants.....	300,000	6.12
Industrial machinery.....	750,000	15.31
Highway machinery.....	1,440,000	29.41
Total.....	4,897,000	100.00

Source: From Porricelli, Keith, & Storch, 1971.

³ J. D. Porricelli, V. F. Keith, R. L. Storch, "Tankers and the Ecology," paper presented to the Society of Naval Architects and Marine Engineers, New York, N.Y., November, 1971.

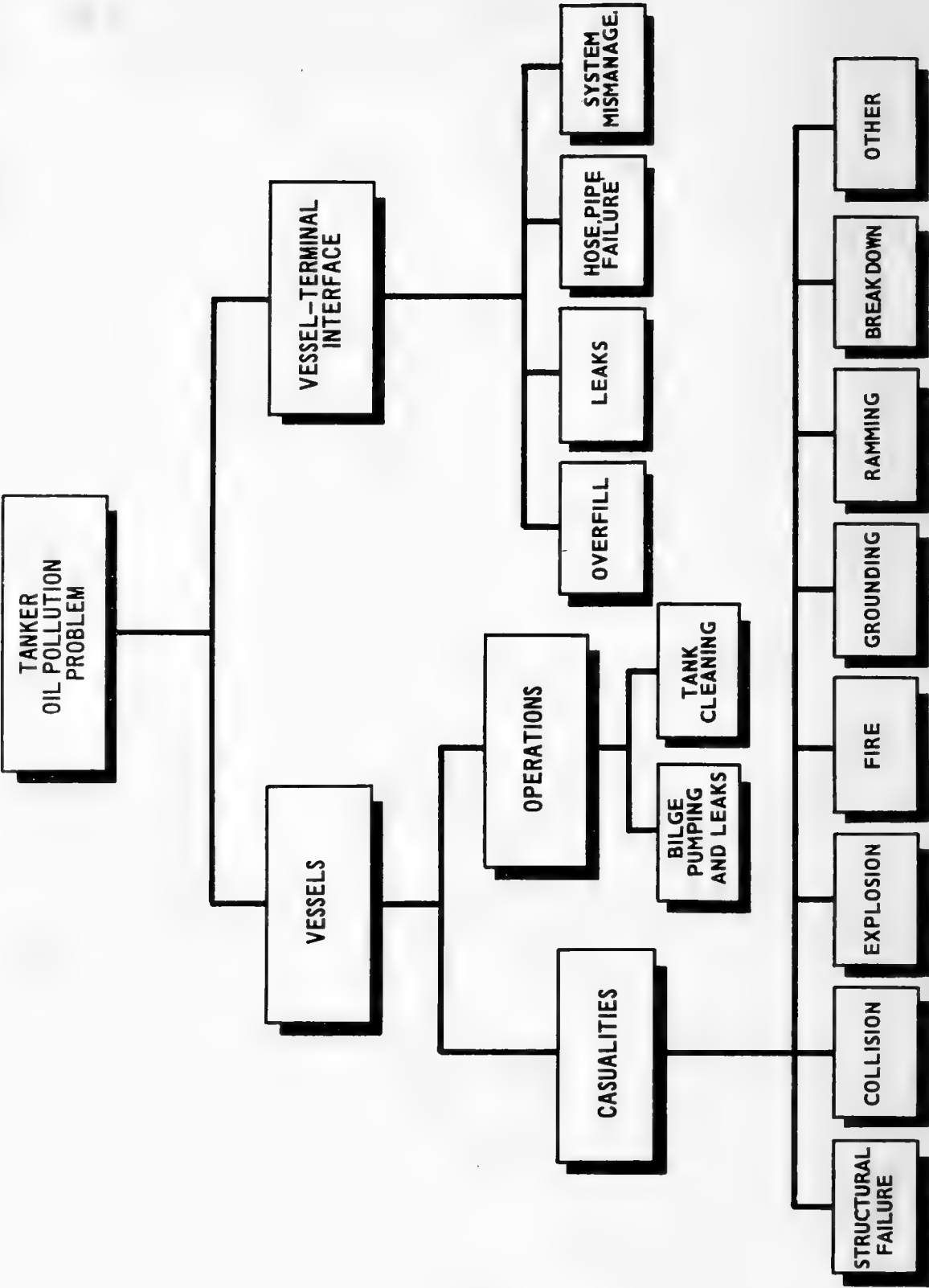


FIGURE 1

TABLE 2.—*Sources of oil pollution to the oceans (from Porricelli, Keith and Storch, 1971; see table 1 also)*

	Percent
Automobile crankcase oil disposal-----	29.4
Tankers -----	28.4
Other vessels than tankers and tank barges-----	17.3
Industrial machinery waste oil-----	15.3
Refinery Petrochemical plant disposal-----	6.1
Offshore production-----	2.1
Tank barges-----	1.4
Total -----	100.00

TABLE 3.—*Relative magnitude of oil influx from various tanker sources (from Porricelli, Keith, and Storch, 1971)*

	Percent
Tank cleaning operations-----	70
Casualties -----	18
Discharges -----	7
Terminals -----	5
Total -----	100

After discharging cargo, a tanker without exclusive segregated ballast tanks will take sufficient sea water aboard in her cargo tanks to insure proper propeller immersion and to provide handling and sea-keeping characteristics. The amount of ballast taken aboard depends upon the anticipated weather conditions, the distance and route of the ballast voyage, the vessel's lightship weight displacement, length to depth ratio, and other vessel characteristics. The amount of ballast taken aboard generally varies from 20 to 50 percent of the vessel's total cargo carrying capacity but may be greater during periods of adverse weather.

The ballast that is put directly into cargo tanks immediately after cargo discharge comes into contact and "mixes" with the oil that adhered to the tank surfaces or remained at the suction mouths after cargo discharge. This oily ballast must be disposed of in some way prior to arrival at the loading port unless the loading port has suitable reception capability. After disposal of the oily ballast, clean ballast suitable for direct disposal into the harbor at the loading port must be taken aboard. In the absence of segregated ballast tanks, empty cargo tanks must be washed down to remove the residue oil and provide space for the clean ballast. These tank washings are pumped overboard and the clean tanks are filled with sea water which can be disposed of into the harbor at the loading port. The number of tanks washed is a function of the particular vessel's proportions, the weather, the route, the owner's desire to periodically clean tanks, etc. This generally amounts to between one-third and one-half of the vessel's tanks per ballast voyage.

This operation is referred to in this section as "uncontrolled ballast discharge." It results in all of the oil residue from the cleaned tanks and approximately 15 percent of the oil residue (clingage; see below) from the tanks which were initially ballasted being pumped overboard. The amount of oil influx that results from this operation on any given voyage depends on the amount of oil that remains in the tanks after discharge at the unloading port. This number is commonly referred to as clingage. Clingage ranges from 0.1 percent to 0.9 percent of the cargo capacity depending on the type of oil, the stripping capability of the tanker, and the internal structure of the tanker; it is considered to average 0.4 percent.

All tankers do not pump the oil residue from their tank cleaning operations directly overboard. With the "load on top" (LOT) system, the tank cleaning residue (water and oil) is pumped into a holding tank. Here the mixture is allowed to settle and the water drawn off the bottom so that only oil remains in the tank. This oil is then combined with the next cargo; hence, the term "load on top."

If all tankers employed a one hundred percent efficient LOT system one hundred percent of the time, tank cleaning operations would not be a major source of oil pollution; however, all tankers are not capable of conducting LOT operations. In addition, LOT operations are not 100 percent efficient and are estimated to accommodate only 80 percent of the potential operational pollution arising from tank washings. This is because:

(1) The LOT system cannot be applied to tankers in the oil product trade since refined products cannot be mixed with one another and cannot tolerate salt content in the same way as most crude oils;

(2) Certain ballast voyages can be so short as to preclude the time necessary for satisfactory operation of the LOT systems;

(3) Depending on sea conditions, the necessary separation process may not be completely effective;

(4) The oil-water interface in the holding tank cannot be accurately determined and this results in a portion of the lower layer of oil being drawn off the water; and

(5) Some components of oil are water soluble.

A total of 967,000 metric tons of oil per year influx to the marine environment is attributed to tanker operations based on the following assumptions:

(1) 75 percent of the 1,300 million metric tons of oil transported at sea (Sun Oil Co., cited in Porricelli, Keith and Storch, 1971) is carried on tankers equipped to operate with the LOT systems;

(2) The LOT system is 80 percent effective;

(3) The clingage is 0.4 percent of the total cargo capacity;

(4) Tanks are ballasted and cleaned to the percentages mentioned previously, that is, one-fifth to one-third and one-third to two-fifths of the tanks, respectively; and

(5) 15 percent of the clingage is taken out of the tanks upon pumping oily ballast.

Pollution From U.S. Flag Vessels

Carrying approximately 5.5% of the total oil carried per year or 71 million metric tons, approximately 53,000 metric tons of oil can be attributed to operational discharges from U.S. tankers. All U.S. vessels including ships other than tankers contribute approximately 39,000 metric tons of oil due to discharges of bilge water containing oil leaked from machinery spaces, leaks and bunkering spills. Worldwide oil discharge figures were computed based on the premise that all oil transported was crude. The actual figure of crude shipment to total tonnage is about 90%, but this percentage was considered large enough to warrant application of the LOT system criteria to all oil shipped, even though LOT is generally not practiced by vessels carrying refined products. Applying the discharge limitation of 1/15,000 the total cargo carrying capacity of a tanker to the total oil carried by U.S. vessels (71 million metric tons), the resulting quantity of oil allowed to be discharged is 4730 metric tons which is less than one tenth the estimated 53,000 metric tons being discharged by U.S. vessels under present legislation. In a worst case situation under present legislation, all tank washings and dirty ballast would be allowed to be discharged without limitation outside of prohibited zones, and at a rate no greater than 100 parts per million (ppm) inside of prohibited zones (for certain vessels, the less than 100 ppm criteria would apply worldwide). It is even possible for a vessel to discharge its entire cargo at the above rates, therefore, introducing a possible 71 million metric tons of oil into the world's oceans. The last situation of course is an extreme case that will never happen, but it does point out that present legislation only regulates discharge rates from tankers and then only in certain situations, whereas the proposed amendments put a finite limit on the amount of oil that can be discharged from tankers as well as improved rate discharge limitations. The difference between the two is greater than ten-fold, considering present utilization of the LOT procedure by U.S. vessels. Additionally, as stated earlier, present legislation allows oily water discharges within prohibited zones whereas the proposed amendments do away with prohibited zones and prohibit *any* discharge of oil or oily mixture within 50 miles of the nearest land. The revised definition of oily mixture under this bill is a further limitation of the proposed amendment that also has the advantage that it is similar to the definition of harmful discharge applied under domestic regulations.

Under the 1961 Act, it is possible for oil record books to be falsified. The proposed amendments to the Act should help cure this problem, as oil record book entries will be tied to the ship's log. The more expanded oil record book will account for all oil received and discharged. Greater specificity of information entered and tank-by-tank information requirements will greatly facilitate efforts in detecting violations of the Act.

Requirements to Comply with Amendment

Discharge limitations under the bill will require that vessels not practicing LOT either :

- (1) Use improved LOT during a ballast voyage ;
- (2) Carry segregated ballast in lieu of dirty ballast ;
- (3) Discharge dirty ballast and tank washings at an oil residue reception facility ;
- (4) Clean cargo tanks at off-loading port, discharging residues at a reception facility, and taking on clean ballast for entire return trip ; or
- (5) Discharge ballast outside of 50 miles subject to discharge limitations.

Increased retention of dirty ballast and tank washings by vessels will place an increased demand on the need for oil residue reception facilities. A survey, done by the Coast Guard for the Inter-Governmental Maritime Consultative Organization (IMCO), has recently been completed and contains information on oil residue reception facilities available in U.S. ports, along with the needs of port based on full application of the 1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, 1954. The survey, which includes inputs from all nations participant to IMCO, will be published when completed, and made available to vessel owners and operators to provide information on the availability of reception facilities. Updates of the information will be published routinely.

Physical impact of the inclusion of these amendments to the 1961 Act will be the need by some ports for either enlarged or the new construction of oily waste reception facilities. Facilities available, but unable to process the oily residues, will either have to develop such a capability or transport received residues to another reception facility or oil refinery that can. Vessels unable to discharge their LOT slops or dirty ballast and tank washings at a port that has neither adequate nor any reception facilities will therefore have to discharge at a facility available elsewhere, taking on clean ballast for the remainder of the trip.

Increases in the quantity of oil residues received will also increase the need for and use of processing facilities. This process includes the separation of oil from water and the refining or re-refining of the residue oil.

Economically, the bill will have an impact on the cost of shipping oil by tanker because of the costs involved with abiding by the new amendments and regulations thereunder. These include :

- (1) The cost to discharge at a reception facility ;
- (2) The cost of utilization of the LOT procedures by vessels not already doing so ; and
- (3) The cost of using segregated ballast.

The first cost is incurred by the construction of reception facilities to receive residues in ports that are not adequately equipped to handle the residues of vessels, and the additional vessel operation cost of retaining dirty ballast and tank washings for discharge at reception facilities plus any delays attendant upon shoreside discharge. LOT incurred costs apply to vessels not already equipped to carry out this procedure and requiring modification to use it. Also, vessels desiring to use LOT instead of either retaining the ballast and washings or carrying segregated ballast may have to spend additional time at sea to allow proper oil and water separation if time at sea would normally be too short to permit the proper separation. Of all LOT costs, aside from vessel modification, lost turnaround time is the largest.

Segregated ballast operations involve two costs. Using segregated ballast, vessels tend to become weight limited rather than volume limited, increasing shipping costs because of the need for more vessels to carry an equal quantity of oil. Existing vessels can use clean ballast, but will therefore carry a reduced load. To meet shipment demands, an increase in vessel sorties or number of vessels is necessary, so that a combination of vessel operating costs and vessel construction costs result from the sole use of segregated ballast.

Compliance with the bill will involve a combination of the three systems by vessel owners. Certain procedures will have to be used in lieu of others depending on the situation. For example, using the LOT procedure, the discharge often contains more oil than the 100 ppm requirement of the 1961 Act. Unless the discharge is watched closely and continuously, it is possible that it will be above the allowed oil-in-water level. With motion induced turbulence during a voyage, settling is only partially effective, and it has been shown that the concentration of oil can

range from 300 to 5,000 ppmp at discharge.¹ Without an improvement in LOT technology, it appears that this procedure is not an acceptable solution to meet the requirements of the bill for discharges made beyond 50 miles of the nearest land. Even with improvement, LOT will not normally meet the requirements for discharges made within 50 miles. It should be pointed out here that ballast is primarily discharged outside of loading points. With the U.S. exporting very little oil, and all coastal oil trade being performed by U.S. vessels, the impact of foreign flag vessels will be minimal since they discharge their ballast and tank washings near the loading point where they pick up their crude oil loads.

Of all procedures, the most effective means of preventing oil discharges on coastal trips is by retention of dirty ballast and tank washings or use of clean ballast.

To measure oil in water concentrations of discharges from ships other than tankers and discharges from machinery space bilges of tankers, vessels must presently depend on visual inspection of the effluent to detect discharges in approaching the 100 ppm limitation (under most conditions a discharge becomes visible at well under 100 ppm of oil in water). Equipment to measure the oil concentration is not off-the-shelf hardware at this time. However, the Coast Guard is evaluating a system for shipyard use that processes machinery space bilge water which produces an effluent under the 100 ppm limitation while retaining that portion of the bilge water that would produce an effluent in excess of 100 ppm.

Great Barrier Reef Consideration

The first of the 1971 amendments to the Convention being implemented by this bill applies the distance from land criterion for discharges of oil and only mixture to the area of the Great Barrier Reef near Australia as if it were land. This will help preserve the reef in its natural state free from pollution caused by oil discharges from ships.

Tank Size/Arrangement Limitations

The other amendments included in the bill relate to the arrangements of vessel tanks and limitations of tank size for new tankers. The objectives of those amendments are to place an upper limit on the quantity of oil which can escape into the sea as a result of collision or other vessel casualty. Annex C to the Convention would make formulae available for design computations in connection with tank arrangements and size for tankers built subsequent to the effective date of the amended convention. Also, certain ships even now under construction would have to comply with the tank arrangement and size limitations within two years after the date the Convention comes into force. That provision would apply to tank vessels presently under construction which will be completed after 1 January 1977 and to vessels completed before this date but which were started after 1 January 1972.

Annex C sets controls on the size and arrangement of tanks in that it stipulates a limit of oil outflow, calculated in accordance with the formulae of Annex C, on the basis of assumed conditions of severe injury, and taking account of the tank volume along with the provision of double bottoms, wing voids, or interrupted arrangement of full and empty tanks. This oil outflow limit shall not exceed 30,000 cubic meters for vessels up to 420,000 deadweight tons and 40,000 cubic meters for vessels over 1,000,000 deadweight tons. The limit is a function of the vessel size between 420,000 and 1,000,000 tons.

The 1971 amendment dealing with tank size and arrangement was the result of the concern of nations participant to IMCO, including the U. S., that construction of large tankers without accompanying control of size or internal arrangement of cargo tanks could lead to the possibility, in the event of a single accident, of catastrophic environmental pollution. This is based on the fact that as tankers have become larger and larger, tank size has proportionally become larger. In some cases, the numbers of cargo tanks per tanker have decreased as larger tankers have been built, causing an even greater increase in the volume of tanks. The IMCO Subcommittee on Ship Design and Equipment developed this amendment with the intention of encouraging design features which would minimize the oil outflow resulting from a collision or stranding. This IMCO action recognized that despite increased operation safety measures, it is not possible to eliminate entirely accidents which lead to the release of oil. However, it is possible to minimize the ensuing oil outflow.

¹ *Ibid.*

The amendment is written assuming damage conditions for both collision and stranding situations. These values represent the severe assumed injuries in such accidents and are to be used to determine, by trial at all conceivable locations, the worst combination of compartments which would be breached by such an accident. The consequence of these injuries should not exceed the hypothetical outflow limits mentioned earlier, therefore, providing criteria for vessel design, encouraging use of double bottoms, double sides, void spaces and segregated ballast.

Economics Analysis

Using IMCO's casualty "worst case" criteria, the following economic analysis was made.

For all types of ships, the economic impact of oil outflow limitations increases with a decrease in the hypothetical oil outflow as the result of collision (O_c) or stranding (O_s). Similarly, increases in ship size with a fixed hypothetical oil outflow value will cause an increase in the economic impact.

Increases in the cost of building and operating vessels corresponding to reductions in the volume of individual tanks was evaluated by means of the parameter RFR (Required Freight Rate to carry one ton of cargo without profit), the value of which is given by :

$$RFR = \frac{SE + K.I}{T_a}$$

where SE = operating cost per year

I = investment cost

$$K = \frac{i(1+i)^n}{(1+i)^n - 1} \text{ amortization coefficient at interest rate } i \text{ for an amortization time length of } n \text{ years}$$

T_a = tons of cargo carried per year

The choice of the parameter RFR offers the following advantages :

(1) Factors like taxes and net profit, which vary from country to country and from time to time, need not be considered.

(2) The evaluation of the increase of cost of building and operating vessels, consequent from a reduction in the tank volume, if given in percent of RFR, would minimize the effect of inaccurate assumptions made in the investment cost.

(3) The calculation of percent increases of RFR provides at the same time all elements to evaluate the absolute value of increases in the transportation cost of one ton of crude oil as a function of the reduction of tank volume.

The following analysis for tankers of 300,000 and 500,000 deadweight tonnage (tdw) was made using the RFR parameter. The requirements of this amendment do not significantly increase the transportation costs for vessels under 300,000 tdw and are not considered in this analysis. For example, a vessel of 227,000 tdw would only incur an increase of 0.5% ; for vessels of 140,000 tdw or under, there is no increase. An analysis for tankers over 500,000 tdw was not made because of the lack of adequate information concerning ships of this size.

TABLE 4.—EFFECTS UPON ECONOMICS OF O_c or O_s VALUES WITH TANK SIZE LIMITATIONS RANGING FROM 20,000 to 40,000 CUBIC METERS

Volume O _c = O _s	Increase of tank across		Increase of RFR (dollars per ton)		Increase of RFR (percent)
	From	To	From	To	
Tanker of 300,000tdw:					
20,000-----	4	11	3.46	3.61	4.3
30,000-----	4	7	3.46	3.52	1.7
40,000-----	4	5	3.46	3.50	1.1
Tanker of 500,000tdw:					
20,000-----	4	17÷18	3.08	-----	¹ 10.0
30,000-----	4	12	3.08	3.26	5.8
40,000-----	4	9	3.08	3.17	2.9
20,000-----	7	17÷18	3.14	-----	¹ 8.0
30,000-----	7	12	3.14	3.26	3.8
40,000-----	7	9	3.14	3.17	1.0

¹ Estimated.

NOTES

O_c = hypothetical oil outflow as a result of collision.

O_s = hypothetical oil outflow as a result of stranding.

Tank across = breadth of tank.

Application of this tank size criterion, as shown in the data, will cause a 1.7% increase in RFR for a 300,000 tdw tanker and an increase of slightly less than 3.8% for a 500,000 tdw tanker (O_c and O_s, under this bill, for a tanker of 500,000 tdw is 31,680 cubic meters). As is evident from the economic data, there is no significant increase in RFR for vessels under 300,000 tdw, a tonnage that includes all U.S. vessels afloat, under construction, or planned. With the majority of U.S. flag tankers under 100,000 tdw and no projected plan for any over 300,000 tdw, the impact of this amendment on U.S. flag vessels is minimal.

Penalties

In addition to the amendatory provisions of the bill which relate directly to Convention changes, the other significant substantive change is in the area of enforcement. The 1961 Oil Pollution Act, with minor exception, provides only for criminal penalties. This bill makes substantial civil penalties also available for more flexible and effective enforcement, and at the same time substantially increases the severity of criminal penalties, discouraging unlawful discharges outside of U.S. territorial waters as well as within as specified by Article VI of the Convention.

3. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Though not effecting the complete elimination of all discharges of oil and oily mixtures, enactment of this bill will cause a significant reduction in the quantity of oil and oily mixture discharge being made. This result is certainly not harmful. It is therefore apparent that there are no adverse effects to the environment as a result of enactment of this bill. However, if the alternative of ballast retention is chosen and additional reception facilities are required, there will be adverse effects on the environment during both the construction and operation phases. It is not possible to assess this impact at this time. Each facility will have to be studied on an individual basis considering not only the facility itself but also the surrounding use areas.

4. ALTERNATIVES

There are two basic alternatives to the proposed legislation. They are:

1. *No additional legislation.*—Do not implement the 1969 and 1971 amendments to the Convention. However, stricter enforcement of present legislation, including the Federal Water Pollution Control Act, as amended, and the Oil Pollution Act of 1961, as amended, both of which address themselves to the control of pollution by oil, should be considered as a part of this alternative.

One of the problems with the present legislation, and part of the reasoning behind the 1969 amendment to the Convention, is the inability to enforce the section of the 1961 Act prohibiting discharges of oil in water greater than 100 ppm. Other than collecting a sample of a discharge before it enters the water, there is no conclusive way of determining if a discharge is an oily mixture containing greater than 100 ppm of oil in water.

Stricter enforcement of the Act in its present form would only insure that vessels built before the effective date of the Act do not discharge oil or oily mixtures greater than 100 ppm within prohibited zones. For vessels of 20,000 gross tons or more, built after the effective date of the Act, stricter enforcement would prevent discharges of greater than 100 ppm from being made outside of prohibited zones. As mentioned earlier in the impact statement, these requirements are only discharge rate limitations and do not limit the total quantity that can be discharged.

Assuming that a practical way existed to insure discharges were within the limits of the Act, full compliance, to the greatest extent possible, would still permit the introduction of a potentially unlimited quantity of oil into the world's oceans because of the lack of a finite limit on oil and oil in water discharges. Lack of a means to identify discharges greater than 100 ppm after the discharge enters the water has made the 1961 Act in its present form extremely difficult to enforce and stricter enforcement almost impossible.

Article XVI of the Convention specifies that an amendment may be determined by the IMCO Assembly to be of such an important nature that any Government signatory to the Convention which does not accept the amendment within a period of twelve months after the amendment comes into force shall cease to be a party to the present Convention. The 1971 amendment on tank size and tank arrangement is one such amendment.

2. *Stronger legislation.*—Stronger legislation for the prevention of pollution by oil includes the prohibition of all discharges containing any oil. This is accomplished by requiring either :

(a) Washing of tanks at unloading point, discharging to a reception facility prior to taking on clean ballast and making the return trip;

(b) Retention of all dirty ballast and tank washings, discharging being done at shoreside reception facilities ; or

(c) The requirement that all vessels carry segregated ballast ; and

(d) Retention of mixtures of bilge water containing lubricating oil which has drained or leaked from machinery spaces.

Procedures (a) and (b) are essentially the same for U.S. flag vessels. The major difference, aside from locating reception facilities at opposite ends of routes, is that washing all tanks prior to making a return voyage with clean ballast generates an effluent of lesser volume and greater oil concentration than discharging dirty ballast and tank washings at the end of a voyage. Generally, oil-water separators are more effective for high concentrations of oil in water, making choice (a) the more desirable. With adequate facilities, it is possible that a vessel could choose to either clean its tanks and take on clean ballast prior to making a return trip after offloading its cargo or take on ballast and retain it, along with tank washings, until it reaches a residue reception facility near a loading port.

The primary disadvantage of using these two methods entirely for preventing the intentional discharge of oil into the world's oceans is the fact that even the most efficient oil-water separators at reception and treatment facilities will not be 100% effective, resulting in the discharging of oil into the harbors and water bodies adjacent to these facilities. It follows that a continuous discharge of a facility effluent containing approximately 10 ppm oil in water (a figure based on equipment and procedures presently available) will occur, not including the discharge of those fractions of oil which are soluble in water and cannot be removed by separators.

Whether or not it is more advantageous to the marine environment to discharge oil at specific locations within the coastal zone at a fixed rate over an extended period as compared to limited discharges made in open waters is highly problematic due to the lack of information on this topic and the disparity of opinions among persons doing studies in this area.

One additional factor to consider while looking at procedures (a) and (b) is that of time. Using procedure (a) would increase vessel voyage time by approximately 10% ; procedure (b) would increase vessel voyage somewhat but not to the extent that procedure (a) would. Therefore, to keep up with shipment demands, an increase in the number of tankers corresponding to the percent increase in vessel voyage time would be necessary, incurring costs and an environmental impact appropriate to vessel construction and operation of these additional vessels.

By requiring that all bilge water containing oil which has drained or leaked from machinery spaces be retained on board for disposal at a shoreside reception facility, this source of oil pollution would be eliminated. However, this procedure is extremely costly because of the necessity to install appropriate retention systems on the affected vessels. For tankers, this is available, in varying degrees, because of their oil transfer system, and retention of oily bilge water is being practiced by a good number of vessels so equipped. This is not the case for ships other than tankers.

The problem of oily bilge water is scheduled to be studied during the 1973 IMCO Conference. Unilateral action by the United States on this problem, besides being costly, would adversely affect competition by U.S. flag vessels on the world market where presently less than 1 percent of the world gross tonnage consists of vessels registered in the U.S. Considering the fact that this source of pollution will be studied at the IMCO Conference this year, any action taken by the U.S. at this time might turn out to be different than action adopted by IMCO. Conversion to meet new Convention requirements would then incur additional costs to vessels meeting other standards.

Segregated ballast helps to eliminate the problem of oily residues and tank washings to a certain degree, though this procedure alone will not prevent all oil and oily mixture discharges from being made from tankers. Table 5 summarizes data from a "Report on the Segregated Ballast Tanker" prepared by the United States for IMCO showing the economic impact and estimated pollu-

tion effect of using segregated ballast on several ship designs assuming certain ballasting assumptions.

TABLE 5

Description of design change ¹	Ships and ballast assumption		Economics		Estimated pollution effect		
	DWT and design	Segregated ballast (percent) ²	Percent increase in ship price	Percent increase in RFR ³	Operational pollution as percent of base ship ⁴	Accidental pollution as percent of base ship	
						Stranding ⁵	Collision ⁵
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Single skin -----	250 E-1	45	4.2	4.6	20-51	146	79
	500 E-1	45	9.0	8.8	19-58	(⁶)	(⁶)
	250 E-2	60	9.8	10.8	13-21	161	66
(2) Double bottom -----	250 B-1	40	6.4	6.1	28-47	54	105
	250 B-2	45	8.7	8.5	2-41	46	101
(3) Double sides -----	250 D	60	10.9	11.6	13-31	247	56
(4) Double skin -----	120 C	60	22.9	20.5	1-5	(⁶)	(⁶)
	250 C	60	17.2	17.2	2-4	85	70
	250 F	100	-----	(⁷)	(⁸)	(⁸)	(⁸)

¹ All changes measured against base freeboard draft large crude tanker of about equal DWT meeting IMCO outflow criteria.

² As percent of full load displacement.

³ Average value for long and short voyages for 0 tax case.

⁴ Range for 2 ballast displacements and 2 tank washing procedures.

⁵ Values are for "typical" stranding or collision.

⁶ Not available.

⁷ Not estimated.

⁸ Design not feasible due to insufficient stability.

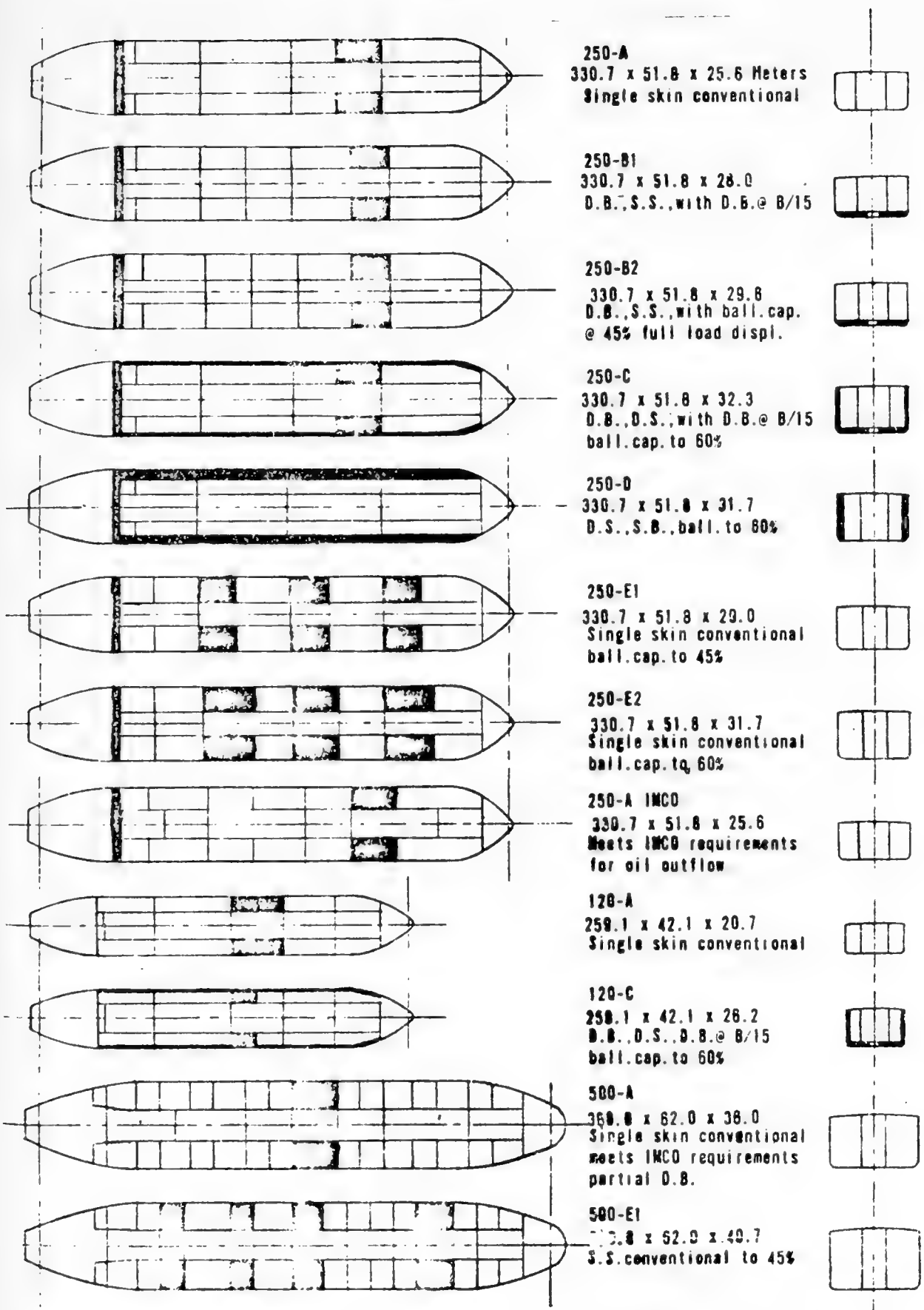


FIGURE 2. SEGREGATED BALLAST TANK STUDY—SHIP CONFIGURATION

Figure 2 shows plan views of the complete group of ships studied along with principal dimensions, ballast location and quantity. It gives an indication of the relative ship sizes and arrangements considered.

A. Ships Configurations—1. 250 Series.—This series is comprised of a family of eight ships developed in sufficient detail to establish construction cost. An additional version was developed only to the extent that its lack of feasibility could be established. With the exception of depth all ships had identical dimensions, displacement, hull form, accommodations and machinery but different tank configurations and deadweights. In all design types the total segregated ballast capacities include ballast carried in the forepeak, the wing tanks, and other miscellaneous tankage. The base ship, (a), is similar to an existing vessel.

(a) 250-A: This design is a single skin conventional ship of about 250,000 L.T. deadweight. It is typical of a large crude tanker now in operation.

(b) 250-A IMCO: This design represents one method of adjusting the design of 250-A to meet the IMCO oil outflow limitation of 30,000 cubic meters. This design constitutes the correct base for comparison of the remaining variations since all subsequent designs also meet the IMCO oil outflow limits.

(c) 250-B1: This design incorporates a B/15 double bottom depth with sufficient depth increase to maintain required cubic.

(d) 250-B2: This design includes a double bottom of sufficient depth to provide a total ship segregated ballast displacement of 45% of full load displacement.

(e) 250-C: This design includes a double bottom with a depth of B/15 plus a double side skin of sufficient width to provide segregated ballast capacity necessary for a segregated ballast displacement of 60% of full load displacement.

(f) 250-D: This design includes double sides of sufficient width to yield a segregated ballast displacement of 60% of full load displacement without a double bottom.

(g) 250-E1: This design represents a single skin conventional tanker with requisite depth increase needed to provide a segregated ballast displacement of 45% of full load displacement. The segregated ballast is carried in alternate wing tanks.

(h) 250-E2: This design has the same features as 250-E1, but provides sufficient ballast to enable a segregated ballast displacement.

(i) 250-F: An end point design not shown in Fig. 2 was considered wherein both double bottoms and double skins were provided which met the IMCO damage assumptions, i.e. B/15 for bottom penetration and B/5 for side.

2. 120 Series.—Two ships form this series. With the exception of depth, both ships possess identical dimensions, displacement, hull form, accommodations and machinery but with different tank configurations and deadweights. The base ship (a) is similar to an existing vessel now under construction.

(a) 120-A: This design is a single skin conventional tanker of about 120,000 L.T. deadweight. It provides a base price for evaluating the effect of changes.

(b) 120-C: This design includes a double side and double bottom with a depth of B/15. As on 250-C the segregated ballast displacement was maintained at 60% of full load.

3. *500 Series*.—Two ships form this series. With the exception of depth, both ships possess identical dimensions, displacement, hull form, accommodations and machinery but differing tank configurations and deadweights. The base ship (a), is similar to a design presently under construction.

(a) 500-A: This design represents a nominal 500,000 DWT tanker. A 477,000 DWT ship was selected as a basis and modified to meet IMCO oil outflow requirements by increasing the subdivision and including a double bottom in the number 2 centerline tank.

(b) 500-E1: This design is similar to 500-A with the exception of a segregated ballast capacity sufficient to provide a ballasted displacement of 45% of full load. The ballast is located in wing tanks placed intermittently along the ship side.

Stronger legislation could also incorporate more stringent constraints on tank size and tank arrangement. As shown in table 4, a decrease in the value of the hypothetical oil outflow from the values assigned in the bill cause a substantial increase in RFR. Decreasing the values of O_c and O_s beyond the 20,000 cubic meter value causes RFR to increase at a rate greater than it does going from 30,000 to 20,000 cubic meters. This is shown in figure 3.

Stronger legislation could include a re-definition of oil as it is defined in the Federal Water Pollution Control Act (FWPCA), as amended. Under the Oil Pollution Act of 1961, oil is defined to mean crude oil, fuel oil, heavy diesel oil and lubricating oil. Under the FWPCA, oil is defined to mean oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. This broader definition would make the Section of this bill implementing the Amendment to the Convention dealing with tank size and arrangement applicable to vessels that carry all petroleum based products and all animal and vegetable oils, not only to those vessels carrying oil, as defined presently under the 1961 Act.

Though keeping the definition of oil under the 1961 Act consistent with the definition under the FWPCA, the U.S. would be taking action that no other nation signatory to the Convention is taking at this time. This unilateral action on the part of the U.S. would impose requirements upon U.S. vessels which would place them in a less favorable position, vis-a-vis international trade. Furthermore, as the bill is written in its present form, unless foreign flag vessels were constructed to meet our requirements under the expanded definition of oil, they would be prohibited from entering U.S. ports. Without a sufficient number of U.S. vessels available to carry the cargo no longer being carried by foreign flag vessels, the U.S. would find itself in a position of having to back down on this definition of oil under this Act.

By implementing the 1969 and 1971 amendments to the Convention, this bill provides the most effective means of working toward the goal of no harmful discharges of oil into the oceans by 1980, while keeping the U.S. in step with the multilateral action that IMCO proposes to meet the 1980 goal.

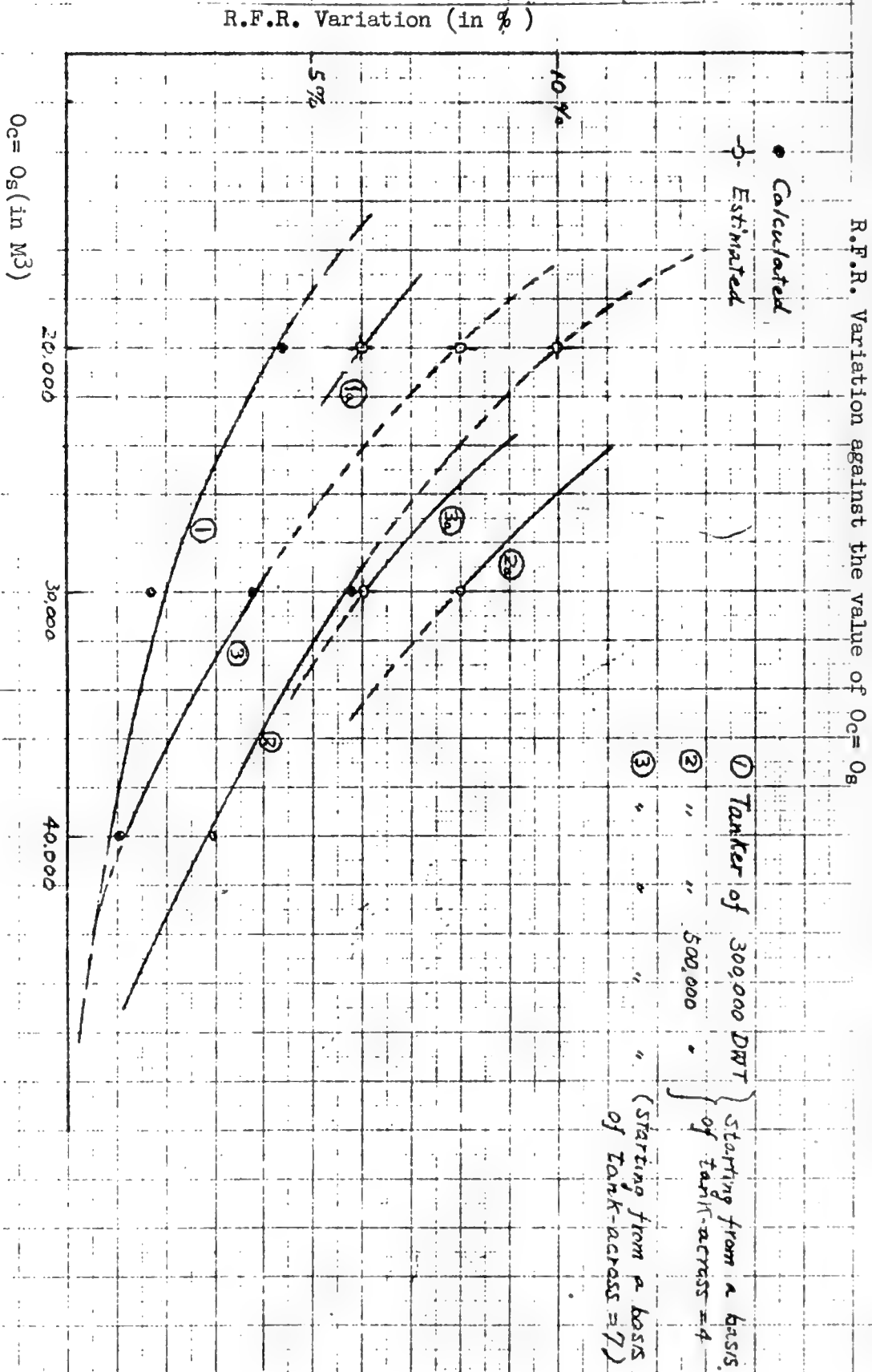


FIGURE 3

5. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Studies have shown that oil in water is not only harmful biologically to marine organisms but to all organisms that interact with marine organisms and ecosystems. The short-term effects of oil such as coastal fouling and damage to bird populations has been documented on numerous occasions. In fact, fouling on the high seas is becoming more frequent than ever before with tar at the sea surface now exceeding the amount of surface plant life.¹ Hydrocarbons, which include petroleum and all petroleum based products, have been found to cause death in a wide variety of lower marine animals at low concentrations. Certain forms of hydrocarbons, specifically the higher boiling saturated hydrocarbons, though not directly toxic, may interfere with nutrition of many marine organisms. Aromatic hydrocarbons, which are abundant in petroleum, represent its most dangerous fraction and are acute poisons for man as well as other organisms. High boiling aromatic hydrocarbons are suspected as being long term poisons. Certain other aromatic hydrocarbons are carcinogenic and can act as tumor initiators.

Though there is much more work to be done concerning the long-term effects of oil pollution, there is a distinct possibility that these effects may be far more serious and longer lasting than the more obvious short-term effects.² Hydrocarbons, once incorporated into a particular marine organism, may pass through many members of the marine food chain without alteration. Not only may they be retained, but they can become concentrated as they pass through the food chain. One serious threat is the potential accumulation in human food of poisons derived from crude oil such as carcinogenic compounds.

Studies done by the National Oceanic and Atmospheric Administration (NOAA) indicate pollution by oil in the Atlantic is more widely distributed than has previously been suspected in that oil extends its massive proportions from Cape Cod, Massachusetts to the Caribbean Sea. Considering the present extent of oil pollution and the possible consequences, it is obvious that reducing the quantity of oil being discharged into the oceans is unquestionably beneficial to both the short-term uses and long-term productivity of the marine environment.

6. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Enactment of this bill will place a demand on certain natural resources, depending on the extent to which the alternative methods to meet the bill's standards are used. By alternative, the resource commitment can be listed as follows:

a. Retention of dirty ballast and tank washings—This alternative will place a greater demand on the need for oil residue reception facilities. Where present capability is not sufficient to meet the demand, facilities will have to be constructed, requiring the commitment of land and various building materials necessary for facility construction.

b. LOT procedure—A minimal commitment of natural resources is involved in the modification of existing vessels to permit LOT operations. The same commitment of these materials is involved in new vessel construction when this system is installed.

c. Segregated ballast—Practice of this procedure will require either an increase in vessel voyages or number of vessels needed to carry a quantity of oil equal to that carried by a vessel not using this system. This will involve commitment of the resources used in vessel construction where an increased number of vessels is needed. The additional energy required to overcome the cargo carrying capacity loss would involve another irretrievable loss.

The resources that have already been committed to vessels that will be constructed in conflict with the provisions of the law as amended by this bill will be lost. Because of the specific implementation dates indicated in the Convention amendments and this bill, and the fact that they are retroactive, any delay in implementation of this bill will result in further commitment and resulting losses of resources.

¹ Dr. Max Blunder, "Oil Pollution of the Ocean," selection from "Man's Impact on Environment", McGraw-Hill Book Company, New York, 1971.

² *Ibid.*

AGENCIES TO COMMENT ON DRAFT IMPACT STATEMENT

Department of Commerce—(a) NOAA
(b) Maritime Administration
Environmental Protection Agency—(a) Office of Water Quality
(b) Office of Federal Activities
Department of Defense—(a) Army Corps of Engineers
(b) Department of the Navy
(c) Office of Oceanographer of the Navy
Department of Transportation—Office of Environmental Quality
Department of Interior—(a) Bureau of Sports Fisheries and Wildlife
(b) Bureau of Land Management
(c) Bureau of Outdoor Recreation

COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT

All comments received concerning the draft environmental impact statement were used in the preparation of the final impact statement. Changes, corrections, additions and expansions to all sections were made as necessary in reply to comments of substantive value. Specific replies to certain comments are listed below.

DEPARTMENT OF COMMERCE LETTER OF NOVEMBER 30, 1972

The sources of the estimated pollution from U.S. flag vessels has been clarified (see page 21).

Vessels under 500 gross tons and tankers under 150 gross tons are not covered by the Convention for the reasons as discussed on pp. 4-5.

The alternative of having holding tanks on board vessels to retain bilge water containing lubricating oil which has drained or leaked from machinery spaces is discussed on pp. 37-38.

Oily waste detection methods and equipment are discussed on pp. 26-27.

ENVIRONMENTAL PROTECTION AGENCY LETTER OF NOVEMBER 22, 1972

Discussion of the definition of oil in the Convention and in the implementing legislation is given on pp. 44–45.

It is felt that the discussion of the limitations of the load-on-top procedure (pp. 19-20) is clear and concise.

DEPARTMENT OF TRANSPORTATION, OFFICE OF ENVIRONMENTAL QUALITY MEMO OF
JANUARY 15, 1973

Section 5 of the impact statement, "Relationship between local short-term use of man's environment . . ." has been expanded.

DEPARTMENT OF THE INTERIOR LETTER OF NOVEMBER 22, 1972

The error noted on page 37 of the draft impact statement has been corrected in the final impact statement.

Section 5 of the impact statement has been expanded to be more specific.

THE ASSISTANT SECRETARY OF COMMERCE,
Washington, D.C., November 30, 1972.

Comdr. D. B. CHARTER, Jr.,
Chief, Environmental Coordination Branch,
U.S. Coast Guard, Washington, D.C.

DEAR COMMANDER CHARTER: The draft environmental impact statement on S. 3766/H.R. 15627, a bill which amends the Oil Pollution Act of 1961 (75 Stat. 402), as amended, by implementing the 1969 and 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended, which accompanied your letter of September 22, 1972, has been received by the Department of Commerce for review and comment.

The Department of Commerce has reviewed the draft environmental statement and has the following comments to offer for your consideration.

The estimated pollution from U.S. flag vessels indicated on page 22 is in question due to the methodology used. For example: The U.S. percentage of total deadweight tonnage would pre-suppose that all this tonnage was actively

engaged in carrying oil. If this is the case, this point should be clarified in the statement.

The Oil Pollution Act of 1961, prohibits under certain conditions, discharge of oil or oily mixture by tankers over 150 gross tons. There does not appear to be any restrictive provisions for vessels less than the minimum tonnage noted. Although this limitation may stem from the 1954 Oil Pollution Convention which the 1961 Act originally implemented, it is felt that the impact statement should cite the reasons these smaller vessels are not now covered inasmuch as they have the same ability to discharge oil or oily wastes as the larger vessels.

It is also felt that the prevention of pollution from general cargo vessels should be addressed in more detail. Provisions should be included to prevent cargo vessels or for that matter any vessel from using fuel oil tanks for ballasting purposes. Some mention should be made of the possibility of having bilges oily/water holding tanks on cargo vessels to retain the oil bilge water until the vessels can discharge the oily waste to a shore side facility. The holding tank may be considered as an alternative to discharging the bilge oil waste through separators and oil content meters.

It is understood that detection equipment for oily waste, such as oil discharge meters measured either in parts per million or liters per mile are not presently off-the-shelf hardware. If this is the case, the draft statement should discuss alternate means on how the oil effluent can currently be effectively measured.

We hope these comments will be of assistance to you in the preparation of the final statement.

Sincerely,

SIDNEY R. GALLER,
Deputy Assistant Secretary for Environmental Affairs.

U.S. ENVIRONMENTAL PROTECTION AGENCY,
WATER PROGRAMS OPERATIONS,
Washington, D.C., November 22, 1972.

Subject: Review of draft impact statement for Amendment of the Oil Pollution Act, 1961 (75 Stat. 402), as amended.

DEPARTMENT OF TRANSPORTATION,
U.S. Coast Guard (GWEP-2/7),
Washington, D.C.

(Attention of Commander D. B. Charter, Jr.)

DEAR DAN: EPA has reviewed subject document and offers the following comments for consideration:

GENERAL COMMENTS

Comparative changes to the 1961 Act could be more clearly shown to the reader, possibly through the use of a chart. Such a chart could reflect major oil pollution prevention procedures under the provisions of the 1961 Act compared to the proposed pollution prevention controls.

While the statement presents a good narrative of existing discharge controls as compared to the proposed discharge controls, it is nevertheless important to show the shortcomings of the proposed discharge controls as compared to our national laws and regulations, e.g., the Federal Water Pollution Control Act as amended, and the Ports and Waterways Safety Act. For example, under the Act of 1961 and the proposed action, the definition of oil is essentially the same. Such restricted oil definition includes only those petroleum based oils and oil products classified as "persistent" in the marine environment will be controlled. The discharges of oils and oil products not classified as persistent will have no controls on them beyond the territorial seas and the contiguous zone. Recent studies have indicated that 37 percent of the intra-coastal flow of tanker traffic around the continental United States is in "non-persistent" oil trade. The exclusion of "non-persistent" oil-carrying tankers in the proposed action should be discussed.

Consideration should be given to expanding discussion related to methods and procedures for enforcement of the civil and criminal penalty provisions of the proposed action.

SPECIFIC COMMENTS

Page 7—Last sentence on page 7 leads into an excerpt of the 1969 amendments and the proposed legislation, and is continued on page 8. For clarity, it is recommended that the first part of the excerpt at the top of page 8 be headed "For Ships, Other Than Tankers, the Discharge of Oil or Oily Mixtures Will Be Prohibited Unless:".

Page 12—Recommend reference to section 11 of the Federal Water Pollution Control Act be updated to reflect the 1972 amendments.

Page 21—The discussion of some limitations of the effectiveness of load on top operations is good in general, however, such discussion could be misinterpreted in the manner presented. There appears to be two distinct and separate problems. One problem is related to the so-called "persistent oil" carriers, and the LOT, tank cleaning, and ballasting problem, while the other problem is related to oil product or the so called "non-persistent oil" carriers. Discussion of the two problems are interchanged on page 21 making it difficult to reach a conclusion.

Page 23—Discussion of the worst case situation and the rationale for total oil carried by U.S. vessels does not appear to include oils carried in intracoastal movements. However, the discussion on page 24 and 25 of discharge limitations indirectly clarifies a part of this question. But, even this indirect approach would be difficult for the average reader to interpret.

Page 25—The definition of oil in the proposed action is so restricted that the implication of increased requirements for shoreside reception facilities could be misleading. Shoreside reception facilities are certainly an alternative for preventing marine pollution by oil: however, since the load on top technique can possibly comply with the proposed discharge limitations for persistent oils, the necessity for additional shoreside reception facilities at this time is not apparent. Of course, the main exceptions would be short haul situations and tanker repair facilities.

Page 36—The recent U.S. efforts to strengthen the IMCO Convention of 1954 as amended is clear evidence that the 1969 amendments are not good enough to prevent pollution of the seas by oil. Therefore, to state unequivocally that, "there are no adverse effects to the environment as a result of this bill" may be an error. This proposed action will certainly minimize or reduce pollution of the seas by oil, but adverse long term effects on the environment could exist but may not be well understood.

Page 40—The 5 ppm oil in water concentration in an effluent from a shoreside reception facility is indeed a conservative figure. It might be more appropriate, based on present day technology, to use design criteria of between 10-20 ppm oil in water concentration.

Page 49—EPA applauds the statement on this page.

Thank you for the opportunity to comment on the draft impact statement. Should you have any questions regarding the above comments please contact the undersigned.

Sincerely yours,

H. D. VAN CLEAVE,
Principal Reviewer.

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D.C., February 5, 1973.

Commander D. B. CHARTER, JR.,
U.S. Coast Guard,
Department of Transportation,
Washington, D.C.

DEAR COMMANDER CHARTER: This is in response to your letter of 28 September 1972 requesting our comments on your draft environmental statement concerning the amendment of the Oil Pollution Act of 1961.

We have reviewed the draft statement and have no comment at this time.

Sincerely,

HOWARD L. SARGENT, JR.,
Colonel, Corps of Engineers,
Executive Director of Civil Works.

DEPARTMENT OF THE NAVY,
OFFICE OF THE CHIEF OF NAVAL OPERATIONS,
Washington, D.C., December 14, 1972.

MEMORANDUM FOR THE CHIEF, ENVIRONMENTAL COORDINATION BRANCH,
U.S. COAST GUARD HEADQUARTERS

Subject: Coast Guard Draft Environmental Impact Statement on S. 3766/H. 15627
Reference: (a) Your letter of 28 September 1972

1. As requested in reference (a), subject environmental impact statement has been reviewed. The statement was forwarded to the appropriate naval officers for comment.

2. No objections were raised to the Draft Environmental Impact Statement, in the form presented in enclosure (1) to reference (a).

3. As a matter of general interest and as an illustration of the economic impact the enactment of this legislation will incur, the following estimated figures are presented that reflect costs of compliance by the Navy with the amendments to the Oil Pollution Act of 1961:

	<i>Million</i>
Changes to oil piping systems-----	\$110.0
Oil clean up equipment for facilities and harbors-----	15.0
Shipboard oil/water separator systems-----	50.0
	175.0

J. A. D'EMIDIO,
Captain, USN, Director, Environmental Protection Division.

DEPARTMENT OF THE NAVY,
OFFICE OF THE OCEANOGRAPHER OF THE NAVY,
Alexandria, Va., December 11, 1972.

From: Oceanographer of the Navy

To: Commandant of the Coast Guard

Subject: Draft Environmental Impact Statement on S. 3766/H.R. 15627

Reference: (a) Telcon 8 Dec 72 between CDR D. B. Charter (C.G.) and LCDR L. M. Riley (OCEANAV)

1. The draft environmental impact statement (EIS) has been reviewed and the following comments are forwarded as per reference (a). Comments are restricted to the thoroughness of the EIS and will not address the desirability of the bill.

2. The EIS, although somewhat lengthy, is complete, thorough and well written with sufficient background data presented to support the individual parts of the statement. However, consideration should be given to rewriting page 49. Various bacteria, yeast etc., do respond favorably to the presence of selected fractions of petroleum. Further, researchers are not unanimous in their opinions as to the effects of petroleum on the total marine ecosystem.

B. E. STULTZ,
By direction.

DEPARTMENT OF TRANSPORTATION,
OFFICE OF THE SECRETARY,

MEMORANDUM

Subject: Draft Environmental Impact Statement on Proposed Legislation to Implement 1969 and 1971 Amendments to the International Convention for Prevention of the Pollution of the Sea by Oil

From: Director, Office of Environmental Quality

To: Chief, Environmental Protection Division, GWEP/73, USCG

This office concurs in the scope and content of the draft statement of September, 1972. However, we offer one suggestion in the interest of clarification of the background data presented in Tables 1 and 2. In Table 1, 29.41 percent of all oil

pollution of the oceans is attributed to "Highway Machinery". Table 2 attributes the same percentage of oil pollution to "Automobile crankcase oil disposal." The paper by Porricelli, Keith and Storch explains the empirical assumptions from which this figure is derived. In order that readers of the impact statement may understand the basis for these somewhat broad assumptions, we suggest that by footnote or otherwise there be some indication that they rest upon the authors' estimate that 75 percent of unaccounted for lubricating oil "ends up in the ocean." The same comment applies to the figure for industrial machinery pollution.

There can be no disagreement with the conclusion stated under "Relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity." However, we believe the case for the conclusion would be substantially strengthened by expansion of the terse statement that "oil in water is harmful." A brief discussion, citing examples of major harmful effects would be useful.

MARTIN CONVISSE.

DEPARTMENT OF TRANSPORTATION,
OFFICE OF THE SECRETARY,
November 28, 1972.

MEMORANDUM

Subject: Draft Environmental Impact Statement Amendment of the Oil Pollution Act, 1961

From: Assistant Secretary for Environment and Urban Systems, OST

To: Chief, Office of Marine Environment and Systems, USCG

We have reviewed the draft environmental impact statement on S. 3766/H. 15627, a bill which would amend the Oil Pollution Act of 1961 to reflect the 1969 and 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil.

Although we have no specific comments, the draft statement provides a useful discussion of the positive environmental effects of the proposed legislation. We look forward to reviewing the final statement and the comments thereto.

JOHN E. HIRTEN.

UNITED STATES DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., November 22, 1972.

Commander D. B. CHARTER, Jr., USCG
Chief, Environmental Coordination Branch,
Washington, D.C.

DEAR COMMANDER CHARTER: In general, we think the Draft Environmental Statement prepared by the U.S. Coast Guard, Marine Environmental Protection Division, dated September 1972, Amendment of the Oil Pollution Act, 1961 (75 Stat. 402), as amended, by implementation of the 1969 and 1971 amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended, is comprehensive and adequate.

The bill would implement the amendments to the convention by modifying, in some instances, the oil and oil-containing discharges permissible from those ships regulated by the convention. It would institute requirements as to new tankers' tank arrangement and size, and create a certificate system to ensure compliance with these requirements. United States flag ships engaged in either domestic or foreign traffic would be required to comply, and provisions would be set out under which foreign tankers could be denied access to U.S. ports or offshore terminals if they are required to, but do not, comply with the new requirements. The bill would also increase fines and institute civil penalties; broaden the authorization as to personnel who may be called upon to enforce the convention; and increase the record keeping requirements to include situations such as loading, transferring, and discharging of oil cargo by tankers.

Some suggested changes are as follows:

Page 4, paragraph 1. Recommend that the word nationality be deleted at the end of the first sentence if it has no legal meaning. However, we would urge that similar legislation be enacted affecting U.S. companies operating vessels under (foreign) flags of convenience. Such legislation might result in substantial reductions of oil pollution in the world's oceans.

Page 37, last sentence. It is believed that the last sentence is incorrect and does not agree with the table of losses from ships shown on page 16. This sentence indicates that the total of the discharges from vessels other than tankers and from the machinery bilges tankers is only 1/10th of the amount discharged as a result of tanker ballasting and tank cleaning operations. The table on page 16 indicates that the losses from ships other than tankers is 600,000 tons per year and from bilges from tankers is 100,000. Thus, the total losses from these sources is 700,000 tons per year as compared to 967,000 tons per year from tank cleaning operations. It is recommended, therefore, that the last three lines (the total of these discharges is only one-tenth of the amount being discharged as a result of tanker ballasting and tank cleaning operations) should be deleted.

Page 49. Paragraph 5, which is in the section concerned with the relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity, is inadequate and inaccurate. The present paragraph really says little, but implies that oil is harmful to all organisms. We believe that a more reasonable discussion of the inadequate knowledge of the harm of oil in water should be included. An example might be found in the offshore drilling environmental impact statement.

Page 51, first sentence, top of page. The phrase, "however, it is conceivable that in a dire emergency some of the ballast tanks could be converted to cargo tanks," seems to be inappropriate. The paragraph is discussing irreversible commitment of resources, and the possible rare emergency use of ballast tanks for other purposes has little or nothing to do with commitment of long-range resources. Also, it is believed that the use of ballast tanks for oil would indeed be rare, if ever.

Sincerely yours,

W. W. LYONS,
Deputy Assistant Secretary of the Interior.

